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NEWSPAPER

Looks at Data Rates

Users May Save 50% on DDS

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – AT&T last week filed proposed rates with the FCC for its Dataphone Digital Service (DDS) which are 40% to 50% below AT&T's present private-line rates, and almost 40% below the rates charged by some of the specialized carriers.

DDS will be the first all-digital service provided by the phone company specifically for the transmission of computer data. If approved by the FCC, the service would begin on May 18 between New York, Boston, Washington, D.C., Chicago and Philadelphia.

DDS will offer users a choice of four data speeds at 2,400-, 4,800-, 9,600- and 56,000 bit/sec along with two types of local line charges depending on how far the DP installation is located from a DDS center or "hub" city.

The Type 1 Digital Access Line (DAL) will apply to users located within five miles of the DDS hub office, while Type 2 DALs will apply to users more than five miles from a DDS hub. The main difference between the two is that beyond five miles, the DDS user must pay a mileage charge for his access line.

The Type 1 DAL rates vary according to speed from $65/mo for 2,400 bit/sec to $200/mo for 56 kbit/sec. The Type 2 rates range from $90/mo for 2,400 bit/sec to $250/mo at 56 kbit/sec. The mileage charge for Type 2 ranges from 60 cent/mile at 2,400 bit/sec to $6/mile at 56 kbit/sec.

In addition, the DDS user will pay from 40 cent/mile to $4/mile for intercity mileage charges, and to round out the complicated rate structure, fixed charges also apply to intercity mileage from $20/mo to $125/mo depending on data speed.

And the user also has to pay the usual installation fees when DDS facilities are installed. These are either $100 or $150 depending on speed.

Since DDS is not an analog line, the user

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Small System Users Are Mostly Happy Users

• S/3 Efficiency Depends On User Ability to Plan Well

By Edie Holmes
Of the CW Staff

NEWTON, Mass. – In the long run, efficient use of the IBM System/3 depends not so much on the vendor as on the user, especially the user's ability to plan well and forecast future expansion needs, according to a recent *Computerworld* survey.

Because of its relative simplicity, the S/3 is often regarded as an entry-level machine for amateurs. And while most S/3 users surveyed expressed satisfaction with IBM hardware and software and schooling, many felt users should be more aware of the S/3's limited upgrade potential.

Don Satterfield of R.E. Jarvis, Southboro, Mass., said, "An overall understanding of accounting and DP is a must for efficiency. The user should have few problems if knowledge

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• Non-IBM Users Experience Several Initial Problems

By Alexander Dumas
Of the CW Staff

NEWTON, Mass. – A solid majority of non-IBM users of minicomputers and small systems contacted in a recent *Computerworld* survey are satisfied with their systems – despite some initial doubts about operating "bugs" and software inadequacies.

Several users, however, have dropped their systems or are in the process of changing to new ones because of inordinate amounts of downtime or inadequate support from the vendor.

Still other users encountered snags in the initial phases of the operation, due mostly to their own lack of experience.

Ease of operation and the ability of the machine to do more work than expected were cited as major plusses by the satisfied users. Even when programming packages were not as good as expected or only

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CW Special Report: Minicomputers & Small Systems **Follows Page 20**

Ansi-Compatible Compiler

Cobol on PDP-11! ...Only in Australia

By Don Leavitt
Of the CW Staff

MELBOURNE, Australia – A Cobol compiler that runs on a 16K Digital Equipment Corp. PDP-11 and includes "most of the 1973 Ansi specifications" has been developed by a local firm but is available – for now – only to users in Australia. Marketing rights in other areas belong to DEC.

Though many minimakers have assembler language, Basic and Fortran compilers, few if any – including DEC – have provided Cobol, which has become the *de facto* standard for business-oriented DP on most full-scale computers.

The developer, Computer Power Australia (CPA), said a virtual memory system is imbedded in its Cobol processor, but the virtual system can be purchased separately from CPA and is available to PDP-11 users anywhere.

(CPA also noted, incidentally, that it has begun studying the feasibility of building Fortran and perhaps other processors around the virtual memory modules.)

'Little Trouble'

Cobol from CPA is compatible with Ansi compilers from mainframe vendors such as IBM and Honeywell. However, the CPA spokesman added, "They don't always use full Ansi; they've got some of their own features." Nonetheless, "anyone who sticks fairly close to Ansi specs and doesn't use special features should have little trouble" moving a program from one of the mainframes to the PDP-11.

The CPA Cobol runs only under DEC's DOS and the developer recognizes that not being a multi-user system is a major shortcoming. Currently the company is talking to another Melbourne-based firm that has a multi-user DOS.

It is not much of a problem to make the Cobol processor multi-user as it executes, the CPA source ventured, though it has to be used by only one user as it compiles. In fact, the two-pass processor generates interpreter-level, and not object-level, code, he added.

CPA sold its general marketing rights to the Cobol processor to DEC in December 1972 but retained rights to sell it in Australasia, which includes Southeast Asia, the Philippines, Hong Kong, New

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IBM Lawyers Advise Silence In U.S. Case

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – In a move that could delay their much-delayed case, IBM lawyers have begun instructing witnesses not to answer certain questions in depositions taken by government lawyers.

The situation came to a head in the recent three-day deposition of IBM Chairman Frank T. Cary, who refused to answer over 30 questions on the advice of his lawyer, Thomas D. Barr.

At the same time, IBM has also charged the government with telling witnesses not

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G-MIS Has Plan to Ease Government Data Transfer

By Patrick Ward
Of the CW Staff

CINCINNATI – The Government Management Information Sciences Users Group (G-MIS) has launched a plan to act as a clearinghouse that will select existing application packages and modify them into common packages that can be transferred from one state or local government user to another.

In cases where no existing package could be modified to serve the purpose, G-MIS would develop one on its own. However, 90% of the time the user group's role would consist of altering existing packages for wider transferability among governmental users, according to Andrews O. Atkinson, G-MIS executive director.

The group has sent a proposal to several federal agencies and foundations for financial support of the clearinghouse project.

Criminal Justice First

Because of member interest, the first application would probably be a criminal justice information system, Atkinson said.

This program and others would be written in modules so that the same packages could be used by both small and large users, the G-MIS proposal stated. Additionally, the packages would be written to run on a variety of CPUs.

The impetus for the current plan came from the realization that despite much experimentation and millions of dollars spent, "the comprehensive, integrated and operationally based" urban information system has not yet been built, the group said.

Instead there are bits and pieces of independent efforts by local governments across the country.

There is "an urgent need" for the sort of generalized software modules G-MIS would like to develop. These could integrate the "bits and pieces" into a "useful and powerful data generation tool for the government decision process," the proposal said.

The similarities of third-generation com-

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Bell DDS Rates 50% Below Private-Line Charges

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will get an interface unit instead of the familiar modem. There will be two types of "service units."

The Data Service Unit (DSU) will provide complete processing of incoming and outgoing data signals. It will interface a CPU or a terminal to a DDS line on an EIA plug level.

For users who want to provide their own signal translation equipment, AT&T will provide a Channel Service Unit (CSU). But there will be no price advantage for the CSU, an AT&T spokesman said.

There is little incentive for a DDS user to select the CSU since there are as yet no signal translation devices from non-carrier suppliers that are compatible with the AT&T services.

The DDS network will utilize the Data Under Voice (DUV) concept which created new digital channels in the previously unused portions of AT&T's existing long haul network. Because the phone company essentially modified transmission equipment already in place, it will be able to charge users considerably lower rates, according to AT&T.

To illustrate the savings to DDS users, if the proposed tariff 267 is approved, a 2,400 bit/sec line between New York and Boston which costs $506/mo under existing private line rates would be $256/mo under the digital service.

From New York to Chicago, 4,800 bit/sec service now costs $1,159/mo, while a DDS customer along the same route would pay $667/mo with Type 1 access lines.

By comparison, an MCI line under its 4K-plus data offering would cost a user $1,084/mo including MCI-supplied modems. This means that the DDS customer would pay about 39% less than current MCI rates. Even with Type 2 access lines at a distance of 10 miles from the hub, the DDS customer would pay only $735/mo.

The specialized carrier most directly affected by the new AT&T service is Datran. Unlike other specialized carriers which have built analog networks, Datran has constructed all-digital facilities. Datran is in operation between Houston and Dallas [CW, Feb. 27] but the carrier has not yet filed interstate rates with the FCC.

Reacting to the AT&T DDS filing, a Datran spokesman said his company had constructed a "digital service for data only, while AT&T has modified its existing facilities, designed and used for its monopoly voice service, to accommodate data. The potential for cross-subsidizing from AT&T monopoly telephone services favoring its DDS service is obvious . . . ."

If such subsidizing is taking place, Datran will "take appropriate steps to oppose such predatory and anticompetitive tactics," the spokesman said.

Similar concern was expressed by an MCI spokesman who said hearings on the DDS tariff proposal "would result in significant changes" (higher) DDS rates. This in turn will mean MCI will still be competitive with the new AT&T service, he added.

Cobol Compiler Runs on PDP-11

(Continued from Page 1)

Zealand and Australia.

At the same time, CPA got a contract from DEC to add some new features. In October or November 1973, the enhanced version passed "a whole series of acceptance tests at Maynard [Mass., DEC's home office]" and serious marketing efforts by the independent started then in this area.

DEC, meanwhile, had no comment on its plans, if any, for making the Cobol available. Industry speculation is that the minimaker is modifying it to run under at least one multi-user operating system before it is released generally.

RSX-11 is DEC's target, according to one line of thinking, even though it isn't really a business-oriented system. Cobol, in that environment, would be just another language available to someone who is primarily a non-business user, one observer thought.

The Commercial Operating System and DEC's Datasystems 300 and 500 are clearly aimed at the business-oriented user, however, and CPA admitted it is interested in seeing whether Cobol could be brought out under the Model 500, which is based on the PDP-11.

The Model 300 is based on the PDP-8 and is outside CPA's area of interest. Currently the Datasystems are keyed to Basic and CPA suspects that DEC really isn't interested in adding Cobol to this environment.

Turning his attention to the virtual memory system, the CPA source said it uses paging techniques to handle the allocation of space in core and on disk. As with most such systems, the programmer "just goes ahead and uses core as if he has unlimited amounts of it," he said.

The virtual memory system by itself is available for $1,500 (Australian) or about $2,000 (U.S.), according to CPA's estimate.

The full Cobol processor – including virtual storage – requires a "disk of some description" as well as the 16K main memory, and can be purchased in this area for $4,000 or $250/mo (Australian).

Though both Cobol and the virtual memory system have been developed for the PDP-11, CPA admitted it is "interested in writing something for some of the other minis." The company has had tentative discussions with manufacturers besides DEC "but we haven't got anything at this stage," the spokesman admitted.

CPA is at 244 Canterbury Road in the Melbourne suburb of Surrey Hills, Victoria.

Say No to Nematodes

RIVERSIDE, Calif. – Do your crops suffer from nematodes? If so, a research program at the University of California here may be able to help.

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G-MIS Wants Clearinghouse

(Continued from Page 1)

puter hardware have encouraged some efforts toward adapting successful application systems to other vendors' equipment.

"But the freedom employed in data processing and data communications systems is now limiting the use of both data and programs and is making their interchange more difficult and costly in all areas of application," the proposal stated.

"Individual state and local data processing centers rely on vendor-supplied operating systems and the manufacturer's version of the applicable programming language. This is the major deterrent to the interchange of data and programs. It encourages and usually even forces the user to embed implicitly in his computer programs many details of the equipment on which the programs were implemented, such as word length, character code, etc.

"This often makes transferring a program for use on other equipment both expensive and time-consuming," the group said.

However, the proposal emphasized, "The successful development of technologically transferable application modules will revolutionize systems development, as all users of such systems would automatically design and/or be able to accept data base elements from other users, providing the key to standardization of forms, systems and operating techniques in a total intergovernmental systems concept."

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IBM Witnesses Told Not to Answer

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to answer questions in depositions it takes.

And Chief Judge David N. Edelstein, who is hearing the case, is clearly worried over the consequences of the actions.

"If any effort is going to be made to bog me down so that you make it impossible to be ready by Oct. 7, I am going to resist it," he told both sides at a recent hearing here.

Deposition problems, he noted, "could bury me under a mountain of paperwork."

The judge also reminded the lawyers that he had wanted to take part in any depositions where problems could arise so that he could overcome them immediately – and wondered why he was not involved in the Cary deposition.

January 1969

Basically, Barr refused to allow Cary to be questioned on anything that happened after January 1969, when the government's suit was filed, on the grounds that the government complaint did not cover any of IBM's activities since that date.

Therefore, Barr excluded any questioning of IBM's peripheral task forces and strategies that played a heavy role in the Telex case – and which earned the firm a negative verdict there.

In addition, Barr refused to let Cary answer many questions relating to the IBM 370/75 and 360/90 systems on the grounds that the government had defined its market to exclude those systems and therefore the government wasn't allowed to ask questions about them – even though IBM does claim they are part of the relevant market.

The government contends, however, that the information on IBM activities after the complaint was filed is relevant since it shows IBM's alleged monopolistic position in the market and it contends it has to have information on such systems as the 360/75 and the 360/90 Series to aid in market definition.

In the countermove by IBM, IBM lawyers told the judge that government attorneys were instructing some government witnesses not to answer questions on government activities after 1972.

Raymond Carlson, lead government attorney for the case, said that all government lawyers – including FBI men who have been helping in the deposition process – had been instructed to have witnesses answer such questions in the future.

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IBM Tells How U.S. Files Destroyed

NEW YORK – IBM has documented its charges that the government has destroyed records that IBM feels it needs for its defense in the massive sntitrust suit against it.

In a filing in Federal District Court here, the firm charged that government records show that in January of this year several files were destroyed which belonged to the Army Materiel Command's Directorate for Management Information Systems dealing with computer selection and use.

The records were important, IBM said, since they belonged to the only man in the command who was listed as a subject of an IBM deposition.

Government lawyers said they did not know why the material was destroyed, but indicated they believed all the records existed elsewhere in different form.

Thomas D. Barr, lead IBM attorney, charged the matter was a "quite serious problem," and that if the files had been destroyed intentionally it was a "very serious problem."

If the destruction had been unintentional, he said he wondered why the government hadn't made more of an effort to protect such documents that would be needed in the case.

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Merchandise Tags Used in Back Office

Store Puts New Wrinkle on Old POS Theme

By Toni Wiseman
Of the CW Staff

ANAHEIM, Calif. – Mervyn's Department Store is using color bar-coded merchandise tags as part of an unusual reporting system – the tags are used in the back office at night, not at the point of sale.

Mervyn's, according to DP manager Donald T. Devencenzi, collects data from the ticket stubs which permits the store to issue three reports a week – two fashion/style status reports and an exception report – which Devencenzi said gave the store an edge over its competitors.

Mervyn's uses NCR 280 cash registers for the usual POS applications, manually keying in the information as required. A few stores, Devencenzi said, still have punch paper tape systems; most have 723 data collection stations; and a few have 751 data concentrators communicating with 725 data collection stations. Soon, he said, all stores will be converted to the 751 configuration, with all processing done on a Century 251 and a Century 200.

Caravan/74

As merchandise is sold, the salesperson manually enters the usual information into the register – operator identification number, merchandise number, price – which is used to develop reports such as accounts receivable and sales statistics.

Then the salesperson tears off the green, white and black stub and saves it for later processing.

These stubs contain up to 54 characters of information within the color bar code, including vendor, size, style and location.

At night, Devencenzi said, two college students wand-read these tags, collecting the data which permits the store to produce its special reports.

"We only have two wands because we knew there was a great deal of question about the future of coded tags," Devencenzi said," and we didn't want to invest a huge sum of money in wands for each register only to find out two years down the road that they were obsolete."

Instead, Mervyn's bought two wands, developed its reporting system and has been ironing out the bugs, preparing for whatever code becomes the industry norm.

The stubs are used to produce twice weekly fashion/style reports giving detailed information on sales trends and merchandise on hand or on order.

The exception reports are only for very slow or fast moving items. For instance, if an item is moving at 150% of the expected rate, the buyer knows within four days, and if he feels this indicates a trend, he can then order for more than the usual eight weeks.

"Conversely," he said, "if we have five weeks worth of goods left in the store and they're only moving at 40% of expectation, you know what item you're going to mark down the next day to get off the floor."

"If we can spot the end of a trend and unload our goods before Sears and Penneys get rid of theirs, we're in good shape," he said.

"The color bar code has done everything we wanted," Devencenzi said. "We're only sorry that NCR has decided to abandon the concept in favor of optical scanning."

Don't Neglect OCR Equipment Maintenance

ANAHEIM, Calif. – With effective maintenance, OCR equipment can provide significant reliability, Robert Murdy of Southern California Gas Co. said at a Computer Caravan workshop on OCR.

Murdy, supervisor of computer operations for Southern, also said cost justification for a scanner will depend largely on the type of applications and the amount of input to be processed.

At the gas company, he said, 300,000 documents are processed each night with a rejection rate of 1% for meter sheets and 1.5% to 2% for customer bills on an IBM 1287.

Preventative Maintenance

There has been no major downtime, thanks largely to a lot of preventative maintenance.

"Maintenance on the printer," he added, "is as important as scanner maintenance."

Regarding cost justification, he said, "If you have massive amounts of information to process in a short period of time, then you can justify OCR."

During idle time (the gas company scanner runs only during the night hours) the time can be used for maintenance.

Forms used on scanners, he said, should "stay basic and straightforward" and not get "exotic."

Test Time Vital for Front-End Unit

By Marvin Smalheiser
CW West Coast Bureau

ANAHEIM, Calif. – Use of an independent front-end processor enabled Hughes Aircraft, Fullerton, to achieve a higher throughput and a lower cost, Frank Oliver of Hughes told a Computer Caravan workshop here last week.

Oliver, teleprocessing project leader, said a Comten 3670 provided a "true multi-CPU support" as well and made possible, at the same time, terminal-initiated line switching and site-initiated line switching.

The Comten, he said, provided 320,000 bit/sec compared with an IBM 3705, which is rated at about 100,000 bit/sec by IBM.

Oliver cautioned users not to expect a turnkey system to be a turnkey system. "You are going to run into problems," he said.

"Don't be overly optimistic and don't be discouraged unless your vendor looks like he is beginning to have problems."

Users were urged to talk to satisfied users of the equipment they are buying.

"Talk to as many as you can and with as many who have as close a configuration to what you have in mind as is possible," Oliver added.

The most important factor in successful installation of a front-end processor system is getting enough test time for the new system on the CPU, Oliver said.

The Hughes configuration includes two 3670 Comtens on two IBM 370/165s with a switching system linking the two front-end processors.

Monthly cost of the two 3670s runs to $9,800, including the switching system, Oliver said.

A comparable IBM system with three 2701s, two 2703s and a small 3705 costs about $13,000/mo, he said.

Work Guides Mean Rethinking

ANAHEIM, Calif. – New guidelines by the Equal Employment Opportunity Commission (EEOC) may well scramble all past ideas about testing potential and current employees, attendees at a Computer Caravan panel on personnel were told.

Frank J. Ofsanke, research administrator for the Southern California Edison Co., described some of the pitfalls that may occur because of the new guidelines.

Ofsanke said the way the guidelines are set up it appears that almost anything could be considered a test, from a personnel interview or a degree requirement or an ability test.

He advised DPers to scrutinize the guidelines and, in their own companies, look for areas where they don't have reasonable numbers of people in order to identify weak areas.

An audit of selection practices was suggested, starting with an applicants' flow analysis and a study of where applicants are recruited.

"Find out where you recruit from since recruiting is also a form of testing," he said.

"Find out where in the selection process, as people go through it, you have some adverse effect . . . where you may be screening out minorities or women.

"Find out if the whole system has some discriminatory effect overall. If not, you're in good shape," Ofsanke said.

"If it does, then break it down into its elements to find out what it is.

"If you are not screening out minorities or other groups, then you have no other further obligations," he said.

Caravan Attendance a Record

ANAHEIM – Boosted by the largest single-day attendance in its three-year history, the Computer Caravan chalked up over 4,000 attendees here last week, bringing the four-city attendance to 12,500.

The largest single-day's registration was 1,666 reached on March 20, the Caravan's second day here.

The Caravan travels to San Francisco this week and then on to St. Louis next week.

Mich. Traffic Violators Find Courtesy Automated

By Patrick Ward
Of the CW Staff

SOUTHFIELD, Mich. – When a traffic case is initiated here, the 46th District Court's computer goes through a full cycle of sending the defendant a notice, scheduling his day in court and printing up the final record of the case.

After a policeman hands a driver a traffic ticket, for example, a copy of it is keypunched for the court's records.

The system sends a "courtesy notice" to the defendant, with the name of the offense, the fine and the date payment is due. If the defendant decides not to contest the charge and mails in his check, the case is settled, according to court clerk Diane Martineau.

But if the driver wants to fight the case, he either contacts the court or simply waits, and the courtesy system will send him another notice listing a court date and either a morning or afternoon session.

After the judge hears the case, his findings and decision are keypunched, and with other information form the official case record.

However, if the defendant has not appeared within 10 days after his scheduled day in court, the system issues a warrant.

If this is ignored for 30 days, the system prints out a "failure to answer summons" form and notifies the recipient that his license will be suspended unless he appears in court or pays his fine.

After 10 more days, the system prints out a "failure to appear in court" form and a portion is mailed to the secretary of state's office informing it that the license is to be suspended.

Court Scheduling Eased

The system averages out the volume of cases the court handles per day and helps the court staff schedule how many persons are coming to court to contest their fines, Martineau noted.

"With the old system," she recalled, "it was too arbitrary for the court to try to schedule things accurately because the court date and the fine's due date were one and the same . . . If we hadn't received their payment by a certain date, well, they could show up and then again they couldn't."

Police officers benefit from knowing in advance if there are any cases scheduled for their court days. If not, they can make other plans. Police officers receive a printout two weeks ahead of time listing cases on their court day.

Under the old system, police officers set the court date when issuing a ticket. Now the computer sets a court date for the officer to appear, until a maximum number of cases in court has been reached. At that point, the computer moves on to the next date the officer is available for a court appearance.

The courtesy notice has also reduced the number of phone calls coming into the traffic violation bureau, Martineau noted, from people who wanted to know what their fines were.

"With so many fines you can't possibly print them all on a ticket," she said, "and people want to know how much it is."

Whenever a local defendant with previous offenses is appearing before a judge, the court dials up its service bureau on a teletypewriter and obtains a printout from its files on the defendant's previous record.

If the defendant is from elsewhere in the state, the court can request the state capitol to retrieve records that will be transmitted on the court's teletypewriter.

The computerized system handles traffic and ordinance matters, plus state cases – felonies and misdemeanors – but not civil cases as yet.

There is also a probation system that is an offshoot of the master system, Martineau stated.

The court clerk and her husband, a systems analyst, developed the original system four years ago to run on a Burroughs B3500 at a service bureau. The service bureau continues to do processing and keying.

Bureau Programmed

The court clerk and a judge developed the courtesy notice plan and added it to the system last December, with the service bureau doing the programming.

Other than small problems when adding new programs, "We've never had any major difficulties," the court clerk said.

The 46th District Court's computerization program was independently developed without state or federal grants, but other district courts in the area have begun using the same system at the same service bureau, she said.

SS Checks Late, Coding Blamed

WASHINGTON, D.C. – Compiling difficulties and problems in uniformly coding approximately 1,400 state and county welfare systems created "inevitable" delays in cash benefits that are still continuing for some of the three million potential recipients of the new Supplementary Security Income (SSI) program [CW, Jan. 30], according to Federal Social Security Deputy Assistant Commissioner Wallace Kendall.

Beginner Problems

Checks for many aged, blind and disabled persons will be two to three months late because of the problems, he added. "Many of the county welfare systems were just paper files, and it would be foolish to assume that a coding process of this size would not have any errors."

Kendall said another major difficulty was the installation of an on-line communication system linking state Social Security information to the federal computer in Washington.

"When people learned of their eligibility for the program, they stormed the state offices. Due to the newness of the communication system and the lack of confidence on the part of the keyboard operators, there were many mistakes typed into the system. In time, this will hopefully be ironed out," Kendall said.

He also said delays resulted from address changes in large city areas. "In New York City alone, there are 10,000 to 15,000 address changes each month, and many of these people don't contact us in time to eliminate mailing problems."

Even with the initial problems, Kendall is optimistic. "We would be lost without the computer, and after a couple of months, we think the administrative problems will be no more than usual."

Try It, You'll Like It

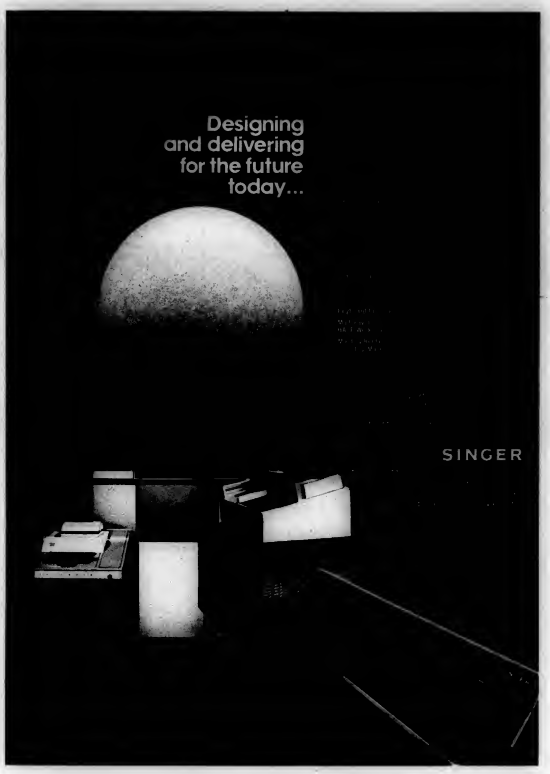
ERIE, Pa. – Quick substitution of a computer for a worn-out billing machine kept this city's tax bills going out and its collections coming in, said City Treasurer C. Francis Hagerty.

Hagerty said his 11-year-old Burroughs E 2100 billing machine broke down in January just as tax bills were due to go out.

Burroughs repairmen said the machine's aging innards were beyond repair, but the company offered to let the treasurer's office use a Burroughs L-4000 computer to do the work.

Clerks from Hagerty's office were taken by police escort to the local Burroughs office where they worked overnight and managed to get the work done on time.

"We didn't lose a dollar," Hagerty remarked. The city treasurer's office expects to purchase the machine soon.



A Special Report Selected from DATAPRO 70

MINICOMPUTER SURVEY $10

Characteristics, Prices and Ratings for 128 Minicomputers

The minicomputer revolution is hitting full stride. As prices fall and capabilities increase, this new breed of compact, low-cost computers is satisfying an ever-widening spectrum of applications. This comprehensive report from DATAPRO RESEARCH CORPORATION surveys the characteristics, features, and drawbacks of the 128 current minicomputers from 46 manufacturers. In addition, the report summarizes minicomputer users' experiences with a total of 1,268 machines. Users rated their machines for overall performance, ease of programming, ease of operation, hardware reliability, maintenance, technical support and software.

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S/3 Success Means 'Know Thy Needs'

(Continued from Page 1)

in both areas is up-to-date.

"No company should rely on IBM people to tell it what to do," he continued, "If you aspire to any kind of efficiency in your operation, someone within the business must understand and control the system."

While some users felt IBM should have perceived their needs more accurately, those with more experience expressed little confidence in a total reliance on IBM's ability to solve their particular problems.

"Our experience in the field, and not IBM's comprehension of our business, sold us the system," said Horace Reeves, DP manager for Blue Jeans Corp. in Whiteville, N.C.

"IBM's S/3 is precisely what we wanted because we knew exactly what we wanted to do. Such small gear requires careful selection, since the machine does not offer tremendous expansion capabilities," one user stressed.

In fact, upgrade limitations was the chief complaint among most of the users surveyed.

"I've gradually become aware of a need for more memory," said one DP manager in Portland, Ore. "I want to be able to run a program which quotes prices and have found that this program is too big for my Model 6's original 8K."

Coming to work for the San Diego Cemetery Association six months after its purchase of a Model 10, Bob Wilson, now assistant controller in charge of all systems analysis design, complained that he can't get the on-line storage he wants. "While Model 15 is supposed to provide this capability, I doubt that it will," Wilson said. "I'll have to go to a 370 or an outside vendor to get what I need."

Some companies indicated neither they nor IBM anticipated the growth rate which eventually put their operations beyond the capabilities of the small business computer. "We've expanded in a short period of time considerably beyond the abilities of the system's initial configuration," commented a Model 10 user in Zainesville, Ohio.

"The growth of our business has necessitated changes in our computer system," noted G.M. Boydston, DP manager for the city of Albany, Ga. "The size of our files eventually required upgrading to a high-speed printer, and our original two removable and two fixed disks had to be replaced with something more flexible."

Despite difficulties, none of the users surveyed was dissatisfied to the point of scrapping the S/3.

Few of those questioned felt IBM oversold or overstated the capabilities of the system.

"I've been satisfied with the performance of our machine in terms of what IBM said it could do," commented Wilson.

Self-Reliant Programming

When asked who does the programming, most of the users surveyed said they prefer to do their own. One user attributed this tendency to the convenience of the S/3's Job Control Language.

Representative of some companies, Colorado River Feed Yard purchased two IBM programs – a program on feed lot management and a payroll package – but otherwise writes its own.

Most comments on system software ranged from "adequate" to "excellent." Satterfield remarked that in two years of operation, his system has never been down a second due to software problems. Only Wilson was unhappy with the software: "It doesn't really drive the machine as well as it could.

"I was tired of seeing computer time wasted with card sorting, so I shipped IBM's card sorters back in favor of Decision Data Corp.'s 9660 sorting keypunch," he added.

The few users who experienced lengthy downtimes resulting from extensive hardware difficulties were impressed with IBM's repair service. Systems engineers received particular praise.

While most users were pleased with IBM's constant updating of S/3 models, Satterfield commented that IBM expects its customers to understand new versions of equipment and software with very little explanation. "I would like to see a greater attempt made to explain in layman's terms what's new about each release."

According to Wilson, "many System/3 users lack experience and have little or no idea of what the system ought to be doing, and the result is that few people complain when the necessary software isn't provided."

A.E. Anderson Jr., DP supervisor for Peerless of America, Inc., said while he finds the S/3 more than adequate, "my experience is limited to two years, so I may not be expecting enough from the machine."

Staffing does not appear to be a problem for most users. The majority reports no change in the number of people running their computers, although those who have expanded their operations indicated a need for a larger staff. Only one programmer said he was hired after IBM predicted the company wouldn't need any additional staff.

> *"No company should rely on IBM people to tell it what to do. If you aspire to any kind of efficiency in your operation, someone within the business must understand and control the system."*

Mass. Would Extend Credit Reporting Act To Other Data Banks

BOSTON – In order to protect consumers "against the massive files kept by a variety of credit bureaus" Gov. Francis W. Sargent has proposed a bill that would significantly extend the Fair Credit Reporting Act in regard to computerized files.

Under the present state and federal fair credit reporting acts, a consumer is entitled to receive a summary of the information held about him in computerized data banks.

'Absolute Right'

Under the Sargent proposals, the individual would have "the absolute right" to seek his complete file – and would have to be told the sources of all information in that file.

In addition, the present laws allow the credit bureau operator to withhold medical information from a consumer even if it is part of the credit file – this would change if the Sargent bill is passed.

In a related move, the governor also filed legislation that would prohibit banks and telephone companies from giving information about an individual to investigators – unless such practices were specifically authorized by the individual or the material subpoenaed.

The more you ask about data communications, the more the answer is minicomputers.

And the more you ask about minicomputers, the more the answer is Digital.

Small Non-IBM Users Happy, Despite Initial Doubts

(Continued from Page 1)

adequate, the users said the hardware was the overriding feature and that little downtime made up for any gripes in the beginning.

Several individuals even indicated that initial problems were probably caused by operators "who knew nothing about computers" or unfamiliarity with the apparatus that was overcome through experience.

Basic Praise

George Price, president of the Graphics Sales Co. in Chicago, was highly enthusiastic about his Basic/4 system. "I wouldn't trade my system if somebody paid me to take another," he exclaimed. "It does all the bookkeeping, along with the business cost accounting. At the push of a button, I can keep track of who worked where, when and for how much," he continued.

Even though he writes his own software for the Basic/4 system, Price said the basic operating system is "outstanding" and the maintenance is good. "In the past two years," he added, "there have only been three or four breakdowns. Once I needed a disk drive at eight on a Friday night. The repairman came at nine, in the middle of a heavy snowstorm."

Another Basic/4 user, Morris Carver, president of the Atlas Paper Co. in Woburn, Mass., cited similar reasons for his satisfaction with the system. "I'm still trying to find a way to deprecate it," he jested.

A Honeywell-58 user commented that his computer's software is "very close, meaning I can't do much to change it, but it does all the jobs expected of it with very little downtime."

DP manager Gerry Slaney of the Fairfield Optical Co. in Mansfield, Mass., added, "I like the system because it is Cobol-oriented, and if we want to move to a larger Honeywell, recompiling of programs will be easy. I'm happy with it because it's cost-effective, more so than other systems we looked at."

Some Scrapping Systems

But not everyone was happy with his system. Several DP managers interviewed presented negative reactions to the machines they're using – or getting rid of.

Kenneth Wallock of National Van Lines in Broadville, Ill., spoke candidly about the Burroughs 1726 they elected to phase out. "We got one of their first," he explained, "and after six months the tape drive went bad and the software didn't fill our needs." He added that during the nine months they used the 1726, it was down about 75% of the time.

"Burroughs had some good ideas in theory, but in practice they didn't work, so we went back to our IBM 360/20 and we have one of their System/3s on order," he concluded.

Similar problems befell the American Hospital Supply Co. in Evanston, Ill., according to DPer David Krapp. "We used a Burroughs 1700 for six or seven months, but there were a lot of bugs and the support people couldn't correct them." Krapp said his company originally ran 13 of the systems as terminals, but now it is using only two for batch work.

Poor software support was the demise of an NCR Century 50 user's operation. He said he had an IBM System/3 on order. "The NCR office in this area is really understaffed," said DP manager Roy Francis of Hess Shoes, Inc., Baltimore, Md.

"We wanted to add their payroll package, but they couldn't get out to us. Then we wanted to add their accounts payable package, and they had nobody qualified to send out to us," he said.

Although the hardware is "fine," according to Francis, the main reason for the switch to the IBM System/3 is because the NCR software is "overly complex and not performing the jobs we want from it."

Lack of Education

Two firms with little or no data processing expertise blamed their own DP inexperience for initial downtime.

Nellie Kemp, accounts receivable supervisor for the Wickes Corp. in Copley, Ohio, said breakdowns when its Qantel 85 was installed three years ago were common because everybody there was used to the accounting machines used previously.

"But now we're used to the Qantel, and with a recent addition of quicker tape drives, I've been able to cut my staff in half. I could never go back to the posting machines," she said.

Another outfit that experienced start-up problems is the Hi-Pro Feeds Co. in Friona, Texas. According to manager Keith Black, the turnkey Sci-Data minisystem installed has "excellent" hardware and scientific software applications that help with the cattle feed rationing.

"But since we knew nothing about data processing, we were told by Sci-Data that we could do all our accounting with their software package. We've had a lot of downtime and Sci-Data is trying to help us out," he said.

But he added that it was a failure on both parts – his company and Sci-Data – for not doing the proper research into the needs of the company.

Other users had mixed feelings about their small systems, although the favorable comments outweighed the criticisms.

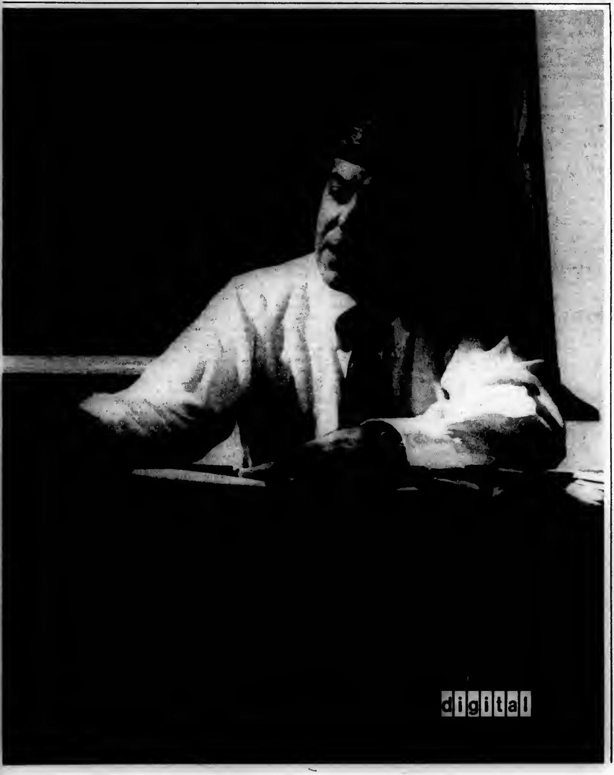
A senior systems analyst for a major U.S. insurance company was one such user with mixed emotions about the company's DEC PDP-11. "It does about three times the work we expected it to, and the software has been very firm," he explained. "But DEC's field service has not been finding the bugs that our own diagnostic tests have revealed, and the repairmen have been taking more time than we feel is necessary," he continued.

He added, however, that the insurance company feels DEC is "financially stable" and will be "around for a while," so they are willing to keep the system.

Two Singer/10 users cited ease of operation as crucial to their business operations. According to controller Jack Noonan of the Astroworld Hotel Corp. in Houston, "When you go on-line, you have to look at more than the computer system, especially when clerks instead of programmers will be running it. Singer is the easiest to operate."

He believes that even though Singer is weak in software (he does his own programming) a chief advantage of the system is its "price/performance."

Noonan's major criticism of the Singer/10 was echoed by another user, Joseph Hellingoetter, DP manager of the Schwinn Bicycle Co. in Chicago. When asked about enhancements to the system and repair work needed, Heilingoetter said the company "was still waiting" for the Singer field service to get around to them. Both users agreed that the maintenance is improving with time, even though a year ago it "left much to be desired."



Editorial

The Consumers Talk Back

Computers are impinging more and more on the general public, particularly with the advent of such systems as point-of-sale and electronic funds transfer.

But to date it is apparent the general public is unimpressed with such systems and a growing consumer backlash could halt their development in the early stages if the developers and users of such systems ignore the warning signs.

And the signs are there:

- Almost every bank that has surveyed customer reaction to EFTS development has found the general public either apathetic or genuinely hostile to the implementation of EFTS.
- Consumer advocates, quoted in the general press and increasingly in the trade press, are reflecting growing hostility to POS systems, particularly where prices are removed from products which are then identified only with machine-readable codes.

This concern is more than justified because so far the developers of such systems have failed to show the general public any genuine advantages of the systems.

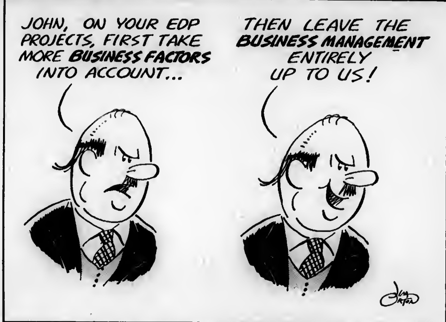
Both POS and EFTS are sold because they offer the using industry – retailing or banking – automation to increase efficiency and because they provide economies of operation.

Both the banking industry and the retail industry are labor-intensive businesses and therefore the automation of some routine functions can obviously save money.

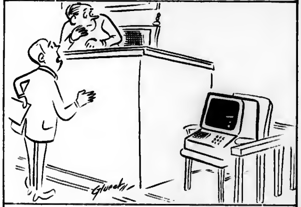
But what about the consumer? Apparently he is the forgotten man in the equation when bankers, retailers and computer specialists meet to plan their systems.

But if the consumer does not accept these systems, the spreading revolt could severely restrict their utility and hamper or quash their growth.

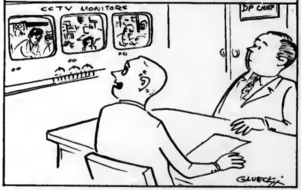
So if the proponents of POS and EFTS want the clearcut advantages they get from marketing and using the systems (i.e. sales and increased efficiency), they had better be able to justify the system's benefits to the consumer.


JOHN, ON YOUR EDP PROJECTS, FIRST TAKE MORE BUSINESS FACTORS INTO ACCOUNT...
THEN LEAVE THE BUSINESS MANAGEMENT ENTIRELY UP TO US!

Ubiquitous Computer



'Now Just How Do I Swear In This Witness?'



'I Call It My Efficiency Evaluator – the Staff Calls It a Lousy Electronic Spy'

Letters to the Editor

Think Twice Before Going Down

I think a few words of caution might be in order for *Computerworld* readers intending to go to Australia.

After reading a form letter I received from the agency which advertised in CW, the following points came to mind:

First, is the practice of soliciting money from job hunters normal?

Second, and this is most important, before anyone sends his $75 check, he should be sure that Australia will accept him!

Several years ago I first considered moving there, and if I remember correctly, there are age limits, as well as medical and race limitations. Also, experience is not substituted for a college degree in classifying me as professional, and there is another limitation to emigration.

My family is still interested in going to Australia, but before sending our check for $75, we'll make sure we're persona grata.

Name and address
withheld by request

Contrasts

In one day, at two very different corners of the country, I enjoyed two absolutely opposite gatherings of the clan. And the contrast, the feeling of "can such things be," was heightened by the fact that I had just come from CW country, a third and even more different corner.

The first meeting was in Tampa: the National Simulation Symposium. Here all was dead serious; there were printed proceedings, deeply involved program chairmen and paper monitors. High software commitments, mostly to Simscript and GPSS, and much emphasis on hardware complements, systems economics, and other tool matters, were evident. Many speakers were young and eager, optimistic. Only a few grumpy oldsters asked why the FAA was still playing the same games in Atlantic City that it was playing 15 years ago, why network models would not really quench the unholy thirst for private minicomputers. It was a sober, even a somber, scene; clearly, though, it was also an optimistic one, except for people like me.

And well might it be, for the idea of simulation and computerization as at least a palliative, perhaps a solution, for many of our most discouraging puzzles is one that even I have been pushing. We have *lots* of things to simulate: transportation nets, energy sources and sinks, economic and monetary interactions. A big relief from the ugly Vietnam military stuff, and even Nasa activities – although the new concerns are not yet nearly as well supported.

Then I flew (you should pardon the expression; "struggled" might be more accurate) to California for the coming-of-age of that great slough of oldsters, the DCA – better known as the Drunken Computer Association. It was held at the Airport Marina in Los Angeles, but my nonstop was diverted to San Diego. Hours late, angry, tired, I staggered into the remains of a very different happening.

It looked like several acres of mild debauchery, mostly because of the dozens of bottles, the kisses of the welcoming committee (female, in my case), and the loud screams of "Down in Front," "Shut Up" and "Duck" – the latter referring to a steady barrage of wine corks and knotted napkins (the rolls had been eaten or trampled by the time I arrived).

Great reunion, it was: Jack Strong and the Armers and Gene Jacobs and the Gruenbergers and Frank Wagner and Sandy Lanzarotta (drafted to be the next chairman, poor devil) and – well, dozens of great old-timers. The head jesters were Bob Patrick and Bob Stone; we missed Bob Rector, who might well have received the Benedict Arnold Award they gave me in '67 when I left for the Bureau of Standards.

There was no technical stuff, little serious talk. There was a frenzy of good fellowship, and every surface indication of optimism and prosperity. Yet here, in the heartland of early computer application successes, there were at least a few moments when the dull aches of our times obtruded. We had fought and bled on a hundred battlefields, many of us for nearly 30 years. We had seen Rand begin and Lockheed flourish and wither, SAGE and SABRE luxuriate, two beastly wars come and go. We had seen IBM swell. We had seen friends soar out of sight and crash to earth – poor Fletcher!

And it was still a very, very tough scene. The world is a mess: we didn't do much after all, did we? The Tampas feed in fresh ideas, fresh bodies, fresh optimism; the Playa del Reys show us, beneath the gayety, how much we haven't done.

Herb Grosch

John V. Atanasoff, DP Pioneer—Part III

Recognized Here, Honored Abroad, He Refuses to Rest

By Georgia G. Mollenhoff
Special to Computerworld

Computer history has been rewritten as a result of a recent court decision crediting Dr. John Vincent Atanasoff as the man who invented the digital computer. This series has profiled the background of the man and his invention and concludes with a view of how he survived the pretensions to his work.

In 1952 Atanasoff started his own firm, the Ordnance Engineering Corp. and bought land in Frederick, Md., about 40 miles west of Washington, D.C. There he engaged in government-connected research for the military.

The intensity of his coping with a problem may be illustrated by his approach to starting his own company. There were two areas necessary for running a business in which he knew he was not qualified: accounting and business law. He taught himself the principles of accounting, allowing only two days, but he permitted himself the luxury of a month to master business law.

He drew all the corporate papers for his venture into private business and when Aerojet General bought the firm in 1957 his legal papers drew admiration from Aerojet's lawyers who later asked to incorporate some of his ideas.

"If there is a book written that tells how to do it, J.V. knows he can do it," his wife says with pride. Though he admits his first few years were a struggle, at the time he sold his company it registered annual sales of $750,000. Aerojet, of which he became a vice-president, persuaded him to accept stock as part of the purchase price and as it soared, the multiple stock splits proved financially beneficial. He smiles and admits only to being "comfortably fixed."

Atanasoff frankly admits he was not convinced in those early years he had invented the first computer. "If I had known the things I had in my machine I would have kept going.".

First hints came in 1954 when lawyers for IBM came to inquire about the ABC and his dealings with John Mauchly. Subsequently IBM and Sperry Rand signed a secret "technological merger" pact which made IBM's litigation over patent rights against Sperry Rand regarding the Eniac embarrassing. IBM then deliberately presented a weak case which was rejected by the U.S. Patent Office in 1959.

In the case just concluded Judge Earl Larson charged that both IBM and Sperry Rand knew that earlier proceeding was a sham.

Other firms, however, worried about royalties regarding Eniac and in 1967 Sperry Rand singled out Honeywell, Inc. as a test. This proved to be an injudicious move by Sperry Rand. Atanasoff emerged as the true originator of four unique concepts of the computer and the Eniac patents held by Mauchly and J. Presper Eckert (Sperry Rand) were declared invalid.

Mauchly and attorneys for Sperry Rand came to the farm near Frederick where the Atanasoffs live in retirement to try to persuade him to testify for them and "just not have as good a memory on some things as I have," Atanasoff says. "They gave up when I told them the nature of some of the documentation I had."

Atanasoff relied not only on his "excellent memory" but credits good files kept for more than 30 years for documenting his nine days on the stand in the lengthy trial in Minneapolis. His testimony was crucial because his associate Clifford Berry died in 1963.

Berry's body was found in bed with a plastic bag over his head. The coroner's report lists his death as a suicide but Atanasoff rejects that report based on personal investigation but will not elaborate beyond saying it is his belief it was foul play.

Neither Atanasoff nor Mauchly wished to be involved in the litigation between Sperry Rand and Honeywell and though Mauchly disagrees with the court decision and describes the ABC as a "little gismo," the relationship between the two scientists is not bitter. Mauchly terms their meeting "affable" and Atanasoff says, "John Mauchly and I are still pretty good friends."

Larson found Atanasoff's testimony "to be credible" and while he did not call Mauchly's lack of memory "willful and intentional fraud," he found it to be filled with "various derelictions in his representations to the patent office."

John Mauchly still takes the position that the Atanasoff-Berry computer was "just a crude little machine that wouldn't really do anything" and that Eniac was "a highly sophisticated and operational machine."

"Eckert and I wish that the Sperry Rand people would have appealed this because it does leave us in a bad position because of the misunderstanding of the court," Mauchly said. "I don't think I learned anything from his papers, and I was merely trying to help the guy in case Iowa State didn't want to finance him. I really don't know what the judge's decision means from a standpoint of the individual patents on Eniac because I haven't had time to review it yet."

Mauchly conceded that it would be difficult to get a more thorough dredging for evidence than in a lawsuit involving the corporate giants of the computer world, but maintained Larson "didn't take into account some very important technical evidence."

Unrecognized by Countrymen

Though the decision to rightfully credit Atanasoff with his invention which has speeded technological advances for nearly 30 years was handed down in October 1973, neither the academic community nor industry has yet honored him in this country.

However, late in 1970 Atanasoff received a letter from Blagovest Sendov, professor at the University of Sophia in Bulgaria saying he was sure the name Atanasoff was Bulgarian and by diligent research in the subject of computers, determined him to be the inventor and closed with an invitation to come to Bulgaria.

Atanasoff confirmed in a reply that his father had come from the village of Boyagic and on impulse quickly made arrangements to accept the invitation. As a guest of the state Atanasoff was entertained for three weeks, taken on whirlwind tours and honored by both the government and the Academy of Science.

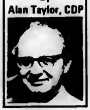
Sendov, in researching the Atanasoff family in the village of Boyagic, discovered Atanasoff was the grandson of a patriot. J.V.'s father was a tiny baby in the arms of the first John Atanasoff (Atanas Ivanoff) when he was shot and killed by invading Turks, the bullet grazing the baby's forehead. This courageous ancestor, still admired by the people, added to his acclaim and made discussion more open and free than it might have been otherwise, leading even to lively debate on capitalism vs. communism.

Not only did Atanasoff meet hundreds of relatives, the visit provided the opportunity to be reunited with a friend from his student days at Iowa State, Boris

(Continued on Page 10)

DP Revolution Rolls On With 'Packaged' Specialists

The Taylor Report
By
Alan Taylor, CDP



Data processing will be more altered this year than it has really been altered during the past two decades – at least that is how it looks now. Already alterations are clearly emerging in the new capabilities of slipping totally different hardware under current software systems [CW, The Taylor Report, Jan. 23] and in the rise of new players on the center field (the Computer Industry Association's intervention in the interface standard matter and in the Computer Lessors Association's support of an independent DOS support system [CW, The Taylor Report, March 6]).

Now March has brought new evidence of an evolutionary change which may have as much impact as the above revolutionary changes.

Evolutions come slowly. In an evolutionary development today looks almost like yesterday, and tomorrow is not very different than the day before yesterday. Evolutions therefore are rarely fully understood while they are evolving. They can, however, be some of the most important factors in environmental change. Witness the still inadequately appreciated importance of the U.S. superhighway system. One must compare the before-and-after situations.

Such a comparison is now slowly becoming possible in data processing. It was underlined for me early in March when at about the same time I received news of two superficially unrelated developments – an announcement of a Series J Cobol developer-and-tester from National Computing Industries (NCT) of Atlanta, Ga., and Release 3 of Volume 4 of Chicago's Callaghan & Co.'s *Computer Law Service*.

The Situation Before

Before the emergence of these specialized services a user installation had to produce its own specialists, either as a routine precaution, or in a hurry when advice was needed. Neither way was very satisfactory.

Routine creation of specialists was expensive,. and once trained the specialist tended to leave the installation no matter how much money he received to attend conferences, etc.

Equally, hiring a general consultant on a crash basis to provide some specialized service was expensive.

A major reason for the problems was simply that the expert had to teach himself practically from scratch on each occasion, and, like the programmer in the 1950s, had really no supporting services.

With the new situation, however, the expert does have supporting services so that the time spent in preparing to give advice that can be acted upon can be greatly reduced. This, moreover, applies to whole installations, as well as individuals.

The Series J and Colleagues

Series J, for instance, is technically interesting for several reasons. Functionally, like a number of Cobol preprocessing systems, it works on a programmer-produced Cobol source program. It produces a Cobol program ready for testing.

However, Series J does more than just normal preprocessor operations. It produces matching programs which, taken together, form as good a testing system as most installations need – and a better one than any installation I have seen, although doubtless often equally good exist.

The features include:

- Facilities for printing Cobol files, including handling invalid Comp-3s.
- Editing of file comparisons, including ignoring of Cobol-trivial differences.
- Testing of test-adequacy and completeness, with lists of tests that have not been checked out.

As I say, Series J is a pretty good system in itself. But what is really important is that it is only one of a number of Cobol support systems being produced by NCI for IBM Cobol users.

A similar concentration upon specialization was included in the Callaghan service. The service currently contains some three-and-a-half 1,200-page volumes of current computer cases, decisions, articles, etc. The last update was a report of some 37 recent decisions involving names like Honeywell, NCR, Burroughs and, of course, IBM.

The service is really for lawyers, but, even so, I found a number of interesting items in it from a technical point of view. Take one of the Burroughs' cases – for instance, Carl Beasley Ford vs Burroughs..

The case concerned an automobile dealer who had purchased Burroughs equipment expecting to get production records that were required under his franchising arrangement with Ford Motor Co. He didn't, and an earlier jury trial had awarded him $56,012.32 damages. Burroughs wanted a new trial, on various grounds which did not particularly interest me.

Don't Write It Down

What I was interested to see, however, was that some of Burroughs' employees had testified that the company salesmen were instructed "not to incorporate programming into written agreements for the sale of equipment, but to enter into oral agreements with the purchasers about the programming to be provided." No wonder there are so many arguments about contract meanings when such conduct is not merely allowed to occur, but is indeed part of the salesman's instructions.

I also found it interesting to see what the judge said about operating manual quality. Apparently there was some evidence about the quality of the instructions in the operating manual supplied, and Burroughs objected to the jury seeing evidence of the argument. The reasons for Burroughs' argument – which the judge struck down – were again unimportant to me.

What I did notice was that the question was not whether the operations manual matched some abstract general standard – but, instead, "whether the instructions in the manual furnished by Burroughs were sufficient to enable plaintiff's personnel [*the Ford agency people*] to operate the equipment properly."

That appeared as good a definition of how to judge an operating manual as any I have heard – and if the lawyers are coming up with such sensible definitions of DP tasks, then the sooner the better we get some of them on the standard committees that have been so unproductive for the past decade.

Again, however, for the computer installation the very existence of the Callaghan service means that the attorneys also don't have to study DP from scratch, nor do they have to put in all their time keeping up with the cases. Again, the cost of specialization has been brought down, and the fruits of specialist work are now available to DPers in small-sized packets.

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Professional Practices

Structured Programming Does Work in a Cobol Shop

By Howard Kimble

Special to Computerworld

Current popular presentations of program productivity imply that for structured programming to be implemented, a user needs a complete new organization, a special library, a special set of review functions and potentially a change in language away from Cobol.

However, the experience in this shop shows that a four-fold increase in programmer productivity, and a real development of error-free programming can be obtained merely by following two basic concepts – top-down writing and avoidance of GO TO jumps.

Top-down programming makes the programmer treat the programming task in a specific organized sequence. He takes the programming functions and subfunctions in a precise order, just as though he were working through the organization chart of a corporation.

As a result, the programmer knows exactly where he is in the program – realizing that he is handling, say the controller's area for instance – and is not so dependent upon having a complete specification of the whole job before he can start productive work. With top-down programming scheduling becomes much easier and programmer productivity is greatly increased.

The Professional Practices Page is coordinated by Alan Taylor and the editorial department of *Computerworld*. Articles should be sent to the Professional Practices Page, Computerworld, 797 Washington St., Newton, Mass. 02160.

Our shop is a Cobol shop, with four programmer/analysts and 300 active programs using on-line, teleprocessing and batch environments. We started with a one-page example of PL/I structured programming, just over a year ago.

Our first structured program included over 314 statements of new Cobol code and took four days to code. Maintenance (estimated for previous nonstructured programs as requiring a man-day) took just over half-an-hour when (as usual) the user requested a program change within a week.

Another programmer wrote his first (24K) Cobol program last year after eight years of experience with BAL and PL/1. The program was operational after only six compiles, mainly to clean up syntax errors. This program, with a run-time of five minutes, replaced a series of programs which had previously taken 30 minutes.

In November a third programmer rewrote an 82K Cobol program, the customer edit update. As it was a rewrite, there was not the usual urgency in getting it operational, and though the program was completed in two man-weeks, the "weeks" were spread out because of interruptions for other work over three times that long. The program ran the first time out and has been running for three months without problems.

In December we started our first three-programmer program, which takes 101K. There were three intermediate compiles during December and January, and on January 11 the first full compile was completed. The program processed on the first time, and became operational in February. After five weeks only two small errors have surfaced – and been easily corrected.

Realistic Forecasting

We have a totally new experience resulting from structured programming – believable and better target dates. Not only have the structured program techniques developed new, shorter estimates, but *in every case* program completion has been sooner than expected.

Moreover, our liaison with users is much better than before. For instance, when programming was started on the Piece Goods Update Program, only broad definitions of system requirements and functions were available. Using top-down programming, details of the system were defined as coding proceeded.

Programmer/analysts now approach the user from how best to provide the application function, rather than from reservations concerning possible programming problems involving completed coding areas that could be created if newly defined desired functions were included.

In brief, the advantages of structured programming are real, and are just as available in small shops as in large ones, in Cobol as in PL/I. And they *can* be obtained without starting up new organizations or libraries.

Howard Kimble is DP manager, Hampton Industries, Inc. Kinston, N.C.

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Dennis G. Sisco – Marketing Manager

Honored Abroad, Atanasoff Still Active

(Continued from Page 9)

Ilieff, who was Professor of Agricultural Engineering at the University of Sophia. He also lectured to an audience which spilled into the hall on the early history of computer machines at the Academy of Science.

His visit culminated in being awarded the Order of Cyril and Methodius, First Class, Bulgaria's highest decoration for scientists. Authorization to make this award had to be approved by the Parliament of Bulgaria and the act was passed one day before he was to leave. Presentation was made the next day.

Not Through Yet

Though pleased by the award, this active scientist whose looks belie his 70 years will never rest on his laurels. Since 1943 he has been busily working to devise a more satisfactory alphabet, one which more closely relates the symbol to the sound.

In order to meet his requirements of phonetic accuracy, high legibility and adaptable to machine use, he has discarded the standard abc symbols and devised characters similar to Braille but ones he hopes will be more efficient.

However diligently he works to speed the spread of knowledge, mathematically or linguistically, Atanasoff takes time to tinker in his well-equipped workshop, raise a wide variety of vegetables in his garden, make wine, devote some time to his hobby of photography and perform a few chemistry experiments. He always finds time for a stimulating chat with his constant visitors.

The world beats a path to the door of the friendly genius who built the first computer.

Random Notes

OS Shops Offered 'Preview' Of Reports, Before Coding

NEW YORK – The Preview sample report generator, now available for OS as well as DOS/360-370 installations, allows planners to include computer-generated mock-ups of proposed reports in management presentations or in assignments to programming staff members.

Using special keypunch forms, the planner enters column captions and positions, vertical spacing instructions and sample data simultaneously. The $125 package includes BAL source code, user manual and a supply of the input forms. It can be ordered from System Implementation Corp., 18 E. 48th St., 10017.

ITS Installs Rush/OS Service

CHASKA, Minn. – Any language processors normally available under IBM's OS/360-370 can be used for program development and execution through the Rush/OS service recently implemented on the International Time-Sharing Corp. (ITS) network.

An outgrowth of ITS' acquisition of some of the assets of Allen Babcock Computing, Inc., Rush/OS includes support for IBM's interactive Cobol debugging package. Compatibility with in-house programming support makes Rush/OS a natural for overload processing as well as development efforts, the network noted, from the ITS Building, Jonathan Industrex, 55318.

Finance Plans on the 'Cuffs'

COLUMBUS, Ohio – Financial planners may define their own commands and establish their own languages to create corporate models under the Cuffs forecasting program now on the Compu-Serv remote-computing network.

Cuffs has the capability to accept structural planning model changes and to reorder and recalculate the model. The system is intended for the non-DP trained planner and model changes written in other languages could completely invalidate the model, the company warned, from 5000 Arlington Blvd., 43215.

Operating System Study Set for May

COLLEGE PARK, Md. – Rushing the season a month, the University of Maryland Summer Institute of Computer Science has scheduled a course on Operating Systems from May 20-24.

Instructors are Dr. Dennis Tsichritzis, University of Toronto, and Dr. William A. Wulf, Carnegie Mellon University. The $325 course will cover current concepts and techniques in design and implementation, with examples drawn from existing systems. Registration forms are available from Conferences and Institutes Division, University College, 20742.

IBM Manual Urges 'Walk-Throughs'

Structured Reviews Can Ease Tensions

By Don Leavitt
Of the CW Staff

BETHESDA, Md. – The conflict and hostility that so often cloud programming project review sessions can be overcome through use of structured walk-throughs, with reviewers picked by the reviewee and with management excluded, according to a modest little IBM manual.

The booklet defines "structured walk-through" as the generic term for a series of reviews, each with a different objective and each occurring at a different time in the application development cycle.

Each walk-through is arranged and scheduled by the developer (reviewee) of the work product being reviewed. The participants are given the review materials prior to the meeting and are expected to be familiar with them.

All attendees know what is to be accomplished and what role they are to play. Management does not attend the session, the manual stressed several times, and the walk-through is not used as a basis for employee evaluation.

The emphasis is on error detection rather than error correction. The reviewee should pick those interested parties who can detect deviations, inconsistencies and violations within the work product or the way it interacts with its environment.

Early in the project, to ensure that the system is functionally complete, the reviewee (probably the analyst) might want user representatives. Later, if programmers and analysts are functionally separate, to ensure that the programmer's internal specifications match the analyst's external goals, the programmer (reviewee) would want the analyst to attend.

Within IBM, the 14-page booklet noted, "it is not uncommon for a programmer to reschedule a walk-through several times in order to ensure that a particular reviewer will be available."

A typical walk-through will include four to six people and will last only a prespecified amount of time. If the objectives aren't met in that time, another session is scheduled.

One person is designated as secretary to record all errors, discrepancies and inconsistencies uncovered during the walk-through. Copies of the secretary's handwritten notes become the action list for the reviewee and a checklist for the reviewers.

Major Concerns

Though objectives differ, all walk-throughs have the same basic pattern. First, each reviewer is asked to comment on the completeness, accuracy and general quality of the work product. Only major concerns are brought up; minor points are handled "off-line," the manual noted.

The reviewee then gives a brief tutorial overview of the work product and "walks" the reviewers through a manual simulation of the function being developed. He goes into enough detail so that the major concerns expressed earlier are explained away or brought into focus.

New problems may arise in this phase of the walk-through, the manual added, but discussion should crystalize everyone's thinking about the project.

Follow Through

Once the secretary distributes the "action list," it is up to the reviewee to ensure that the points of concern are successfully resolved and that the reviewers are notified of actions taken or corrections made.

After describing structured walk-throughs the booklet described how such sessions complement some of the newer concepts of programming including top-down planning, programmer teams and project support libraries.

Copies of the manual, entitled "Structured Walk-Throughs: A Project Management Tool," can be obtained from IBM's Installation Productivity Programs Department, 6400 Goldsboro Road, here in Bethesda, 20034.

Support Package Improves TSO Data Editing, Terminal Access

TEQUESTA, Fla. – Users of IBM's Time-Sharing Option (TSO) have more flexible data editing facilities and better utilization of hardware features of various display terminals with the TSO Editor enhancement package from Palm Beach Computer Consultants (PBCC).

With the Editor enhancements, users can now copy, move and duplicate lines in their edit data sets. All data set types are supported and any TSO-supported terminal may be used, PBCC said.

The package also provides support for a full-screen editor command for IBM 3275-2, 3277-2 or equivalent terminals. This new subcommand displays 22 lines of the edit data set in card image format, including a full 80-char. line. Normally the TSO Editor displays only 79 char./line, the company spokesman added.

The full-screen edit facility allows any of the displayed lines to be edited by moving the cursor or by using the insert and delete keys. Forward and backward paging, with the ability to edit any and all lines on any page, is also available under this subcommand.

The TSO enhancement is said to simplify training since it eliminates the need to use up, down, find and change keys to do simple editing. It also reduces CPU time and increases productivity, the company said.

Any 360 or 370 on which TSO will operate may be used. Storage requirements include 1,900 bytes (plus 3,900 for GETMAIN) for the full-screen edit; 1,200 bytes for COPY; 1,300 for MOVE; and 1,000 for DUP. All subcommands are reenterable and may be placed in the Link Pack area, PBCC noted.

The subcommands have been tested using OS/MVT Release 21.6 and OS/VS2 Release 1.6. Any modifications required for OS/VS2 Release 2.0 will be provided free.

The MOVE, COPY and DUP subcommands can be purchased for $330; the Full-Screen Edit for $660. Prices are per installation, not per CPU, the spokesman added, from 126 Fairview West, 33458.

Free-Form Queries Use 'Mark IV'

CANOGA PARK, Calif. – The facilities of Mark IV file management software are available to batch or time-sharing users without use of formatted coding sheets or short form keyword references equivalent to forms positions, with the On-Line Query Language (OQL) processor now available from Informatics, Inc.

OQL allows the user to express his retrieval or reporting requirements in terms familiar to his normal job without any DP-imposed restrictions. An input editor then internally converts the free-form user coding into a form that the Mark IV system can handle, and the processor takes over from there.

This high-level processor which makes the presence of Mark IV transparent to the user was developed by Bell-Northern Research of Ottawa, Canada.

With the availability of OQL, users now may have three means of defining (coding sheets, keyword, free form) and two modes of executing (interactive or batch) problems for Mark IV processing. The new query facility will function even with the lowest level of current Mark IV systems, a spokesman noted.

OQL requires the on-line executive option, however, he noted. The executive and either the batch-oriented or interactive processor can be acquired for $10,000 beyond the cost of Mark IV itself. The second processor is then available for another $7,500.

Informatics is at 21050 Vanowen St.

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Move to Programming No Longer Seen As Logical Career Path for Operators

The problem of the dead-ended career path for computer operators is being resolved. Research in 50 leading organizations this past summer indicates firms are reevaluating interest and aptitude test procedures for selecting operators.

J. Daniel Couger On Education

I believe the function has enough variety of tasks and room for personal growth to justify a career path all its own. The unique problems of the operations department tempt me to recommend that this function be reassigned to another functional area of the firm, where similar circumstances exist.

Many of the surveyed organizations have abandoned the career path which channeled operators into programming. Few operators become successful programmers. The nature of the work in the two activities has less commonality than many other activities within the company.

The dead-end data processing career path suggests a more logical assignment to the operations function of the firm, to enable employees to advance through those career paths. For example, the banking industry has a major function, entitled operations, which has much more in common with data processing operations than does the system development function.

Keeping operations and system development functions in the same organization is similar in concept to combining the engineering and manufacturing functions of a firm. Manufacturing personnel are not expected to advance into engineering jobs. Nor is it logical that the operator career path be linked to that of system development.

A few firms still require newly hired programmers to serve an apprenticeship in operations. A few others attempt to hire associate degree level personnel as operators, so they are able to advance into programming. Both approaches beg the question, "What is the proper career path which meets dual operational objectives: optimal efficiency in operations and opportunity for employee advancement?"

If system development and operations were separated, similar to engineering and manufacturing, the documentation problem would finally be lessened. Just as manufacturing forces engineering to provide comprehensive documentation of design, operations would finally have the lever to pry similar quality in documentation from the system development function.

It appears unlikely that such a reorganization will occur in the near future. Therefore, the internal educator is faced with the continuing task of designing training programs for a group of employees whose qualifications and motivations are very different from those of system development personnel.

The surveyed companies which have been relatively successful in operations training have two characteristics in common: training programs were developed by a person who specialized in this function and the training program concentrated on proficiency in operations, instead of qualifying a person to leave that department.

Also, the career path consisted solely of operations jobs. Just as a journeyman lathe operator rarely aspires to become an engineer, the skilled operator knows his limitations concerning becoming a system designer.

Fewer personnel problems arise in those companies which concentrate on selecting employees whose capabilities and education are commensurate with the tasks in operations.

In such an environment, the training/education task is weighted more heavily toward training (e.g., JCL courses, VS/VM operators courses), than on education (e.g., a college/university course in math or psychology). Those persons who demonstrate an aptitude for supervision are provided training/education opportunities more heavily weighted toward the education side, e.g., communications skills, organizational behavior and leadership principles.

Couger is professor of computer science and management at the University of Colorado.

'Maps,' 'CAS-III' Updated by Comserv

MINNEAPOLIS – Comserv Corp. has released expanded and enhanced versions of two products: Manufacturing and Production System (Maps) and Computerized Accounting Systems (CAS-III). Highly modular, each runs on IBM 360/370 under various environments.

The basic Maps has three modules: engineering data control, requirements planning and inventory control. Additional segments include capacity planning, forecasting, purchasing, process data control, shop floor control and standard costing.

The recent extensions of Maps include engineering change effectivity control, time-phased allocations and net change requirements planning using an integrated communications-oriented data base and file structure.

CAS-III can interface with the Maps Inventory module or function as an independent system. Under the general CAS caption, there are modules that handle financial reporting, accounts receivable and accounts payable, in varying degrees of complexity.

The CAS updates have added historical records, flexible and firm budgeting capabilities and an extensive report writer and data handler that works in terms the accountant understands, even without a DP background. CAS-III is a load-and-go system, Comserv noted.

The CAS-III systems run in 32K bytes of storage under OS or DOS. The Financial Reporting System is available in object code form, and costs from $12,000 to $20,000 depending on options. Accounts Receivables costs $5,000 (Open-End) or $9,500 (Balance Forward). The Accounts Payable module costs $8,000, the spokesman added.

Maps also runs in a maximum 32K partition under DOS, OS ("real" or VS), or interfaced with CICS, IMS or Total. The basic system costs $15,000; the other modules are separately priced from $3,000 to $7,000 each. An installation cost of "about twice the module cost" covers tailoring to user needs.

Comserv is at 3050 Metro Drive, 55420.

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Replaced IBM 1050s

Bank Moves Stocks With On-Line CRTs

By Patrick Ward
Of the CW Staff

NEW YORK – Moving to on-line CRTs to handle a stock transfer application has saved the Chemical Bank $1.8 million/yr., mostly in personnel costs, according to Dennis Stein, assistant vice-president.

The bank acts as stock transfer agent for over 1,000 corporations. Since January 1973 the bank has been using Bunker Ramo 2206/17 CRTs for on-line entry of debits and credits that are involved in the transfer of stock certificates.

The bank had been using IBM 1050 typewriter terminals and ordinary electric typewriters to handle the workload. Looking for a less expensive method, the bank evaluated the IBM 2260, the Sanders 720 and the Bunker Ramo unit in the fall of 1972.

The Bunker Ramo unit was less expensive, seemed easier to use and had more function keys available than the IBM 2260, Stein remarked.

The bank also felt the BR terminal was more geared to the expected high volume use than the 2260, Stein added.

Bunker Ramo also agreed to provide software support necessary to interface with the bank's teleprocessing system, he mentioned.

Credited to Buyer

Operators key in source data from item tickets coming from brokers. These are packages of stock certificates plus instructions for their transferral. The shares are debited out of the seller's account and credited to the buyer's account.

The system creates new certificates for the new owner and prints them out on an IBM 1403 printer.

After entering an item ticket's information, operators compare totals to see that credits equal debits.

If the totals do not balance, the item ticket goes to a validation clerk who checks the entries item by item and corrects what was in error.

The system checks for erroneous keying, like an alphabetic character in a numeric field, and also checks the file to see that a stock certificate about to be debited from a person's account is actually in that account.

Operators work with preformatted screens to enter the debits and credits. These screens include fields for certificate number, amount of shares, runs and so forth.

User Casebook

With the previous system, clerks prepared the stock certificates and transfer sheets (the legal record of the transaction on typewriters. Other clerks validated and filed the output manually.

The bank also used IBM 1050 typewriter terminals, capturing the information on tape and processing against computerized files at night.

Results of the 1050 keying would come back the following day showing what the system had accepted and what it had rejected.

The bank has replaced all typewriter entry with the 60 on-line terminals already installed, and plans to add 60 more by August when the last 1050 will be replaced.

The on-line system requires about 150 less people, mostly input and control, than the previous system, Stein noted. This is where most of the savings are, he added.

The stock transfer department's terminals access an IBM 370/165 several miles away. A BR 2222 control unit handles up to 18 CRTs and a BR 2228 transmission control unit controls the 2222 and transmits data at 2,400 bit/sec directly to the CPU, Stein noted.

The bank originally set a goal of 10% or less hardware or software downtime, and "we've experienced less than that," he said.

The Bunker Ramo 2206/17 terminals lease for less than $100/mo, Stein said, and the 2222 control units, depending on configuration, cost between $330/mo and $600/mo. The 2228 transmission control unit is about $800/mo more, he added.

Noncarriers Could 'Pollute' Phone Net, AT&T Official Warns

WASHINGTON, D.C. – The uncontrolled interconnection of noncarrier equipment to the telephone network "could pollute transmission and cause noise, wrong numbers and in some cases complete failure of the connection," according to T.L. Simis, assistant vice-president of AT&T's computer communications and data services group.

Speaking at a seminar sponsored by the Electronic Industries Association (EIA), Simis predicted regulatory approval of Bell's proposed high/low private-line rate proposal. And when this service becomes operational, customers will switch from dial-up services to the high/low private-line offerings, he added.

If data and other customers shift to private-line services, this could mean "a doubling of the present monthly charge of about $7/mo for basic residential service," Simis warned.

Also Introduces Portable Terminal

NCR Adds 3 Displays for Century, POS Systems

DAYTON, Ohio – NCR has introduced a portable data terminal and a series of display terminals that feature black-on-white characters on a 12-in. screen.

The 796 display series includes three terminals that are compatible with the Century line of mainframes in addition to the 270 and 275 financial terminals, the 725 in-store processor and the 280 retail terminal.

The low-cost basic terminal, the 796-101, is teletypewriter-compatible. It communicates in an asynchronous conversational mode, one character at a time. An internal printer interface allows attachment of an NCR 260 unit for hardcopy output. It leases for $80/mo or $2,000 purchase.

The intermediate 796-201 is designed for users who edit copy before transmission, who enter new data into predetermined formats for reporting purposes or who use graphs and charts. It can communicate in any one of three modes – conversational or character at a time, message or line at a time, or a page at a time.

An optional integrated acoustic coupler allows communications through a telephone handset. Another option provides an 11,520-element graphics matrix for design of charts or graphs. It leases for $130/mo or costs $3,000.

The 796-301 is for use in a polled communications system where up to 96 terminals can share a single line, either stand-alone or in clusters, with the central processor initiating all contacts. This terminal operates in either the page or message mode at speeds up to 9,600 bit/sec. It leases for $150/mo and costs $3,500.

The 101 and 201 will be available immediately, with the 301 scheduled for June deliveries.

The 260-5 portable terminal with an acoustic coupler and nonimpact printing weighs 30 pounds. It is self-contained, having a built-in power supply, acoustic coupler modem and keyboard.

The unit is plugged into an electrical outlet and a telephone receiver is placed in the acoustic coupler. Inquiries are entered through the keyboard and the responses are printed by the terminal.

The 260-5 uses a matrix-type thermal printhead which instantly forms letters and numbers on heat-sensitive paper. Printing speed is 30 char./sec.

The unit can transmit data serially by bit at up to 300 bit/sec. It has a 94-char. print set, including upper- and lower-case letters, and prints 10 char./in., 80 char./line and 6 line/in. It has a 10-key numeric pad in the keyboard.

The 260-5 printer is priced at $2,795 or can be rented for as little as $110/mo on a three-year contract. Customer deliveries will begin in the second quarter of 1974.

ICA Sets Conference

NEW ORLEANS – The International Communications Association will hold its annual conference at the Fairmont Roosevelt Hotel here May 6-10. Called Telecommunications – Innovative-Competitive-Active, the conference will include an exhibition with about 100 suppliers.

Registration information about the ICA meeting is available from James D. Martin Jr., manager of communications systems, National Steel Corp., 700 Chatham Center, Pittsburgh, Pa. 15219.

Bell Canada Planning Packet Net

TORONTO, Ont. – The Computer Communications Group of Bell Canada is planning to build an "intelligent network" for data communications users.

Utilizing packet-switching techniques, the network will consist of "strategically located" minicomputers which will act as multiplexors, switchers and communications controllers, according to W.B. Hewat, assistant vice-president for computer communications at Bell Canada.

Speaking at the spring conference of the Association for Systems Management held here recently, Hewat said the transmission facilities required for the intelligent network would be constructed on the all-digital Dataroute.

The packet-switched net will provide virtually "error-free" transmission using complex error-checking and correcting technology with an estimated "one undetected error event every two years, Hewat predicted.

The intelligent network will recognize messages from a variety of terminals operating at various speeds with differing codes and data formats. It will include a "high order" of security arrangements to safeguard the information of its users, limiting access only to those authorized, he said. Security arrangements will include alternate routing and encrypting.

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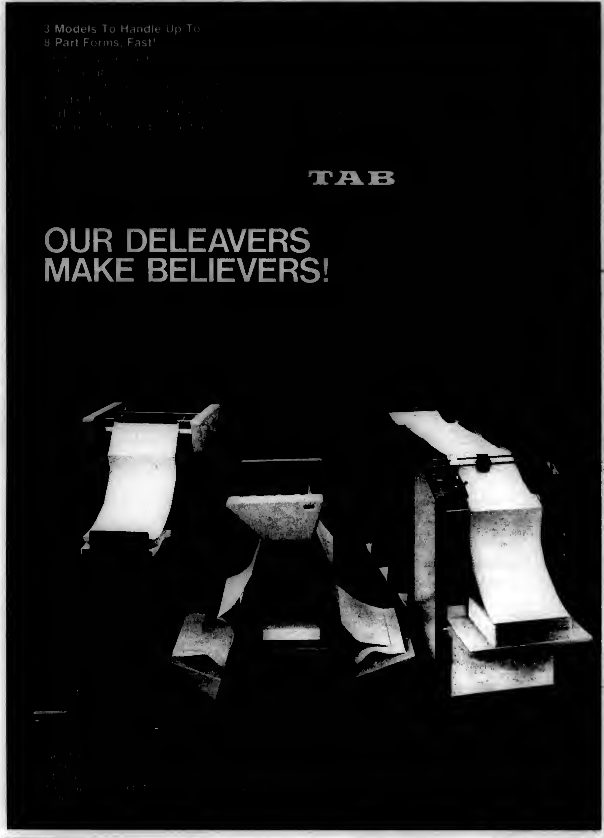

HP Multiplexer Sends Signals From 16 Lines

PALO ALTO, Calif. – A multiplexer that enables signals from up to 16 communication lines to be channeled through the HP-2100 I/O system has been developed by Hewlett-Packard.

Designated 12920A, the $2,200 asynchronous 16-channel multiplexer operates at programmable data rates from 57- to 2,400 bit/sec/channel and can interface with asynchronous devices that are hardwired locally or connected remotely through a Bell or equivalent 103-type data set.

With the addition of an optional control interface, priced at $800, up to 16 Bell or equivalent 202-type data sets can be connected. The optional interface also enables operation of up to eight Bell or equivalent 801-type automatic calling units. The multiplexer can operate any mix of these devices simultaneously and independently regardless of their differences in bit rate, line discipline and operating mode. The multiplexer conforms to EIA RS-232 standards to insure industry-wide compatibility, and is immediately available from 1501 Page Mill Road, 94304.

Modem Operates To 1,800 Bit/Sec

ROCKVILLE, Md. – Penril has developed a low-speed, synchronous FSK modem with strap-selectable operating rates of 150-, 300-, 600-, 900-, 1,200- and 1,800 bit/sec.

The Model 1800S can operate in simplex, half- or full-duplex modes over dedicated lines or the dial network using a Bell CDT manual data access arrangement.

The 1800S offers a narrow-band carrier detector which can be strapped to respond only to a Mark tone from the remote modem or to both the Mark and Space tones, according to the firm.

Request to send and clear to send delays, carrier detector response timing, transmitter output level, controlled or constant RTS and receiver squelch can all be strap-controlled, the firm stated.

Diagnostics for analog and digital loopback tests are provided.

The modem costs $545 with delivery in 30 days from the firm at 5520 Randolph Road, 20852.

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#4 Delivery	4/19/74
#5 Delivery	5/17/74
#6 Delivery	5/17/74
#7 Delivery	6/21/74

370/168 Model K

#1 Delivery	4/19/74
#2 Delivery	5/17/74
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2. Minicomputers have an absolute 64K addressing limit.

3. The only way to even access more is to resort to some sort of hardware kluge with a hairy software scheme that'll cost you an arm and a leg.

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Because now there's the Interdata 7/32 – a powerful new 32-bit minicomputer with main memory expandable up to a million bytes and direct addressing up to 16 million bytes.

Performance	7/32	Nova 840	PDP-11/40
Word length	32	16	16
Memory speed (nanoseconds)	750	800	900
Maximum memory capacity (bytes)	1,048,576	262,144	262,144
Addressing range (bytes)			
Direct	1,048,576	512	65,536
Relative	±16,384	±256	±32,768
Indexed	1,048,576	65,536	65,536
Double indexed	1,048,576	No	No
General-purpose registers	32 32-bit	4 16-bit	8 16-bit
Index registers	30 32-bit	2 16-bit	8 16-bit
Vectored interrupt levels	Yes	No	Yes
Minimum interrupt overhead time (usec)	6 5	47 5	46 5

Price	7/32	Nova 840	PDP-11/40
32 KB processor	$ 9,950	$12,930	$15,345
64 KB processor	14,450	19,330	26,925
128 KB processor	23,450	35,630	44,725
256 KB processor	41,450	61,230	80,825
1 Megabyte processor	171,650	Not available	Not available

Source: Data General Price List, 5/15/73. DEC PDP-11/40 Price List, 6/73. DEC OEM & Product Services Catalog, 1972. Auerbach Minicomputer Characteristic Digest, June, 1973. "How to use Nova Computers", 1973.

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Bits & Pieces

Two Matrix Printers Added To Sycor 340 System Line

ANN ARBOR, Mich. – Two matrix printers from Sycor, Inc. may be used with the company's Model 340 intelligent communications terminal.

The Model 3484 (80 char./sec) and Model 3485 (165 char./sec) printera use standard, fanfold, sprocket-feed paper, from four in. to 14-7/8 in. wide with up to 132 print positions.

The Model 3484 printer is available for $133/mo on a two-year lease or $155/mo on a one-year lease, including maintenance. The Model 3485 printer is available under the same arrangements for $215 and $250, respectively.

Sycor is at 100 Phoenix Drive, 48104.

Okidata Disk PDP-11-Compatible

MOORESTOWN, N.J. – Okidata Corp.'s plug-compatible disk/controller system for DEC's PDP-11 minis is priced 15% below DEC prices, according to the firm.

The system, designated the M-200D/11, is a plug-to-plug-compatible replacement for DEC's RS11/RF11 series, and offers in its basic model 256K words of storage. It is expandable in 256K word increments to 2M words maximum with four disk drives. Capacities below 256K words are also available.

Price for the basic 256K-word storage system is $12,145. It includes controller, disks and all necessary cables, documentation and software to make a complete memory subsystem for the PDP-11.

Okidata is at 111 Gaither Drive. 08057.

Terminal Ribbon Helps Security

SCHAUMBURG, Ill. – Security can be beefed up by use of an Addressograph Multigraph cartridge ribbon on IBM Selectric II-type terminals.

Duroclear III uses a thicker coating on its polyester film ribbon in a cartridge which allows the ribbon to advance one-sixth a character as a key is struck. This obliterates the readable ribbon produced with other cartridges, which could be read to reveal access codes or passwords.

Duroclear III is priced at $7.50 per box of two from AM, 1834 Walden Office Square, 60172.

Standby Plant Generates 25kW

MANKATO, Minn. – A 25kW power plant for either standby or continuous duty has been recently developed by Katolight Corp.

The generator is available in all standard one- or three-phase voltages up to 600 V.

Voltage regulation is certified as 2% standard and general regulation throughout the load range is normally better than 1%, according to the company.

The system is priced at $5,560 from the firm at 3201 Third Ave. North, 56001.

A Look at 1985 – Part IV

Moving Head Disk to Remain Best Bet

By Vic Farmer
Of the CW Staff

SAN FRANCISCO – Memories, memories everywhere – just what does it mean over the next 10 years? That's the quandry the Office of Science and Technology of the Canadian Department of Industry, Trade and Commerce sought to clear up when it commissioned the Mitre Corp. to assess computer memory technology recently.

Although the complete study results are presently restricted to the Canadian office, two Mitre engineers who worked on the assessment presented a summary of results at the recent IEEE Computer Society International Conference here.

Hamstrung somewhat by vendors who were reticent to play their technical cards too openly, Richard R. Martin and Harry D. Frankel of Mitre were still able to estimate the probability of usage of each memory technology predicated on anticipated advances in characteristics such as access speed, storage density, reliability and power dissipation.

Memory technology assessment, however, is directly tied to access speed, which is increasingly crucial for mass storage systems. So the team also considered the organization or architecture of computer elements and techniques such as software, materials, logic design, hardware layout, registers and fabrication.

The table gives the probability of commercial development of the various technologies or the continuance of their usefulness.

Tape Dominant

The researchers maintain that magnetic tape will continue to be a dominant technology over the next 10 years with continuing developmental activities giving an increase in bit storage densities and decreased cost per bit.

Magnetic drums and fixed-head disk, both effective in some commercial and ruggedized systems will most probably be replaced by charge coupled devices (CCD), bubble memories, CRT storage or domain tip propagation (DOT), the Mitre team said.

But "no new technology of equivalent or better access time will be competitive with moveable-head disk on the basis of cost per bit during the next 10 years," they claimed.

True, access time will be a problem for some applications such as Swap memory which is used on virtual machines and requires short access times, erasability, high transfer rates and low cost. In those cases, CCD, bubble, CRT or DOT memories will be used but based on improved access time rather than cost per bit factors, according to the researchers.

During 1973, the cost per bit performance of core memory was superceded by semiconductor memory and the team sees "all types of semiconductor memory chips on a steeply descending price curve," in part due to the highly competitive semiconductor market.

The apparent fabrication cost advantages of planar magnetic film memories, almost as old a technology as core, never became practical and for the most part this technology is dead. Plated wire technology also will be replaced rapidly by semiconductors, according to the team.

Bubble memories are one of the com-

(Continued on Page 20)

	Application*	1975	1980	1985
Magnetic Tape	OFM	99	99	99
Magnetic Drum	ONB	99	40	40
Magnetic Disk				
Fixed Head	ONB	99	40	40
Movable Head	ONB/OFM	99	99	99
Floppy	OFM	99	99	99
Magnetic Core	PM	99	90	50
Magnetic Film				
Planar Film	PM	35	25	25
Plated Wire	PM	40	40	40
Magnetic Monolithic	PM	40	25	25
Semiconductor	PM	99	99	99
Magnetic Bubble	Swap	20	50	50
Charge Coupled Devices	Swap	60	60	60
Magneto Optic	ONB	5	10	15
Holographic	ONB	5	10	15
Superconductive, Josephson	PM	5	5	5
Acoustical Delay Line	Swap	10	20	20
Switchable Resistance	PM	5	10	15
Ferroelectric	PM	5	5	5
CRT	Swap	70	60	60
Domain Tip Propagation	Swap	70	60	60

* Application Code: PM-Processor Memory; ONB-On-Line Bulk Memory; OFM-Off-Line Mountable Memory; Swap-Swap Memory.

Probability of Operational Equipment Expressed as a Percent

Scan Optics' 410 OCR Reader Handles Smaller Document Sizes

EAST HARTFORD, Conn. – The Scan Optics 410 Optical Character Reader handles data on documents ranging from 3 in. by 2-1/4 in. to 6 in. by 9 in. at a scanning rate up to 2,000 char./sec and up to 500 multiple line document/min.

The basic package includes scanner; multiple font capability; an 8K, 16-bit word minicomputer; magnetic tape controller; magnetic tape drive and I/O console.

Operationally, the package provides on-line character insertion, 90-degree scan rotation and the sorting combinations in three output stackers, each with an average capacity of 1,200 documents, according to the company.

Up to four tape units of either 800 or 1,600 bit/in. and additional core in 4K increments up to 32K can be attached. The 410 provides increased program flexibility and lower operational cost to the high volume processing of turnaround documents and other physically small data-bearing records than other Scan-Optics equipment, the company said.

Although the basic system includes one numeric font, additional fonts may be added as required.

Software includes a parameter drive language, Scan, that permits definition, execution and specialized user funtions to be added in assembly language coding; a subroutine library for performing various arithmetic, editing and data manipulation functions; and system utility programs.

The basic system includes one 7-track, 556 or 800 bit/in. or one 9-track, 800 bit/in. tape drive and controller.

Optional features are handprint, journal tape, mark sense and edge mark, readability; serializer; card reader; paper tape reader and punch; systems clock and line printers. Prices range from $3,300/mo to $10,500/mo, depending on configuration, from the firm at 22 Prestige Park, 06108.

Controller Gives Novas Floppies

OAKLAND, Calif. – The Model 3190 floppy disk controller, introduced by Decision, Inc., includes read-before write address verification, automatic data verification, 16-bit polynomial divisor CRC check, diagnostic mode and individual drive write protect.

In addition to handling up to four disk drives, the 15-in. square controller board also accommodates a real-time clock and teletypewriter or other communications interface.

The 3190 controller is compatible with any Data General Nova minicomputer and uses the DMA channel. It will accommodate Shugart Associates and Memorex floppy (flexible) disk drives.

A single controller is priced at $1,990. A complete system with Decision Operating System and Fortran costs $4,100.

Decision is at 5601 College Ave., 94618.

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Second Day **Data Communications Update**
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On-Line Systems and Equipment Selection

Third Day **Operations Management**
with workshops *on*
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Multi-Vendor Installations and Small Centers

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*** Note: Earlier ads had incorrect location for Charlotte. Correct location for both Forums and Exposition is: Charlotte Civic Center, 101 South College Street**

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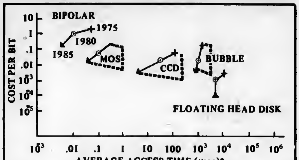
Memory Technology Will Remain Stable



*The broken lines give the range of values expected from now to 1985.

(Continued from Page 17)

petitors for Swap memory but they have a slower shift rate than CCD, are more complex than DOT and are two years behind these other technologies.

"Assuming the use of new amorphous materials, which will permit high density storage, bubble memories have potentially the lowest cost per bit for Swap memory," Martin and Frankel said.

CCD technology has one advantage, they noted. It uses standard metal oxide semiconductor (MOS) production facilities and techniques and many manufacturers can convert easily. "The bit density should be three to five times that of the simplest MOS random-access memory (RAM) and therefore the cost per bit should be one-third to one-fifth that of the RAM.

Shift rates of production devices will initially be 1 to 2 mHz with potential improvement to 100 to 200 mHz," the team predicted.

Holographic memory was pretty much panned in the assessment for two major reasons: the storage medium and the page composer. And Mitre found the solutions to these problems will be costly or will seriously degrade the performance parameters of the system to the extent that they will not be as attractive as combinations of disk and other technologies.

As to IBM's Superconductive Josephson tunneling gates that operate at liquid Helium temperatures, the assessment was clear: "It is doubtful that cryogenic memories will be built, other than as a curiosity, through 1985."

Technology Assessments Available?

Parts I, II and III of A Look at 1985 covered some of the material Arthur D. Little, Inc. (ADL) wrote about in the Air Force DP Technology Assessment.

The report is not presently available, but may be available after June. The title of the report is SADPR-85 Technology and Coat Forecast; the contract number is AF F19628-74-C-0093, the author is ADL and the contracting agency is Study Group XR-SF Electronic Systems Division Air Force System Command.

If the document becomes "unclassified" it most likely will be further distributed through the National Technical Information Service after June. Interested users "may" be able to get an early copy through the Defense Document Center, Cameron Station, Alexandria, Va. 22314.

Part IV of the series is based on a study "Computer Memory Technology Forecast," Martin, R.R., L. Daniels, P. Conway and H.D. Frankel, the Mitre Corp., Report MTR-6483. This report is proprietary to the Planning and Evaluation Branch, Office of Science and Technology, Department of Industry, Trade and Commerce, Ottawa, Canada.

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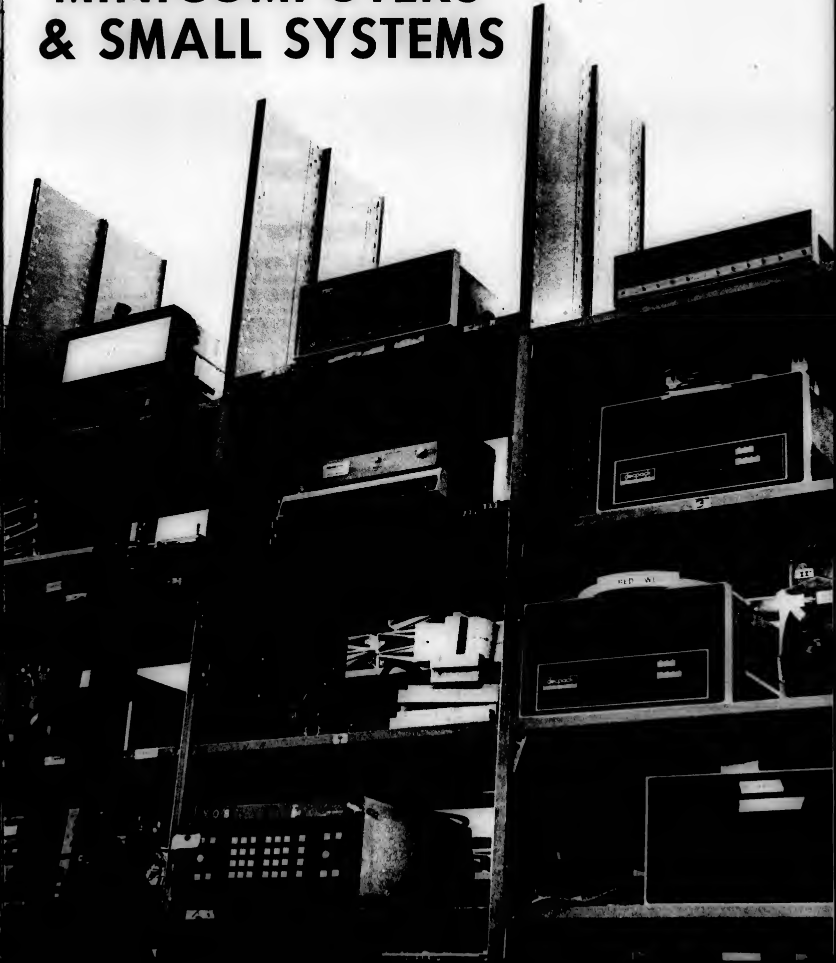
A Computerworld Special Report
March 27, 1974

MINICOMPUTERS & SMALL SYSTEMS



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Interface Problem Clearing Up

Price War Helps Cost/Performance

Barriers to Minicomputer Applications Under Siege

By Vic Farmer
Of the CW Staff

Over the last year, minicomputers have begun to break through the barrier of limited peripherals, limited interfaces and limited applications.

Today independent peripheral companies are offering previously unheard-of "blanket compatibilities" such as "interfaces with all popular minis" or "all presently available minis."

And the interface technology has become so widespread that some companies just come out and say, "If there is an interface the user needs we'll design it for him."

Because of these advances, the standard business computer-oriented manager must eventually acknowledge that dedicated mini systems may just be more cost-effective for certain operations than a larger mainframe.

True, large batch jobs may never be effectively run on any mini system, but combinations of interactive minis and dedicated applications can be easily engineered, and the real problem of the mini's software is coming under control daily.

There is a price war on today and unlike the large monopoly-ridden larger CPU environment, this war will provide a sophisticated user the best processing for his money.

Technology in the form of higher circuitry. density per square inch is taking control, and while medium- and large-scale integration (MSI, LSI) of electronics components makes cost/performance investigations more difficult, they most often favor the mini-based dedicated system.

As the president of one minicomputer company summed it up recently: "The larger mainframe manufacturers are hog-tied by long, complex development cycles, after which their designs must be pretty well frozen. Minicomputers, on the other hand, are smaller, less complicated and much easier to rework to incorporate MSI and LSI technology."

Indeed, presently available circuitry is put into use in the minicomputer environment much more rapidly and provides more sophisticated and efficient designs in a shorter turnaround time.

For general users, these packaging advancements may not be readily discernible from a quick look at the skins surrounding the mini, for recent advances which have dropped the physical size of minicomputer circuitry 100 times or more do not often cut down on the size of the mini itself. After all, how could a manufacturer sell a cigarette pack-sized PDP-8? It's too easy to drop on the floor.

Instead manufacturers have allowed plenty of empty space inside their equipment for the myriad of options available through plug-in boards; semiconductor memory, CRT interfaces, etc.

Intelligent terminal makers have seized on the smaller circuitry units and over the next year, there should be more CRT terminals incorporating more logic, bigger memories, disk drives and printers and having the ability to handle major dedicated applications.

'Live It Up While You Can – We'll All Be Running Little Bitty Minicomputers Soon Enough'

The standard mini turnkey system is now widely available through a number of firms. It uses a 16-bit architecture, a couple of CRT terminals, a fixed and removable set of cartridge disks, a 100- to 300 line/min printer, and an operating system that will allow several jobs to run concurrently.

Unfortunately, the biggest problem with nearly all of these small business mini-based systems is the lack of a standardized Cobol capability. Each company has managed to derive its own stylized subset of Cobol, tagged it with loads of "Cobol-like" labels, but eliminated the compatibility with other small systems.

This tying in of specialized and possibly effective options may be cost-effective as long as the user keeps his original system, but it is sure to play havoc when the user has to upgrade his equipment or change vendors.

But with all the advancements in electronics, the electromechanical peripherals continue to remain a problem. Impact printers are most dependent on electromechanical design but the business environment will always be dependent on multiple copy output.

Tape and disk technology seems under control and reasonably stable even though cost improvements hardly match those in the CPU and semiconductor memory areas.

One of the problems often faced by users considering minis is: "Just who is going to put the system together?"

Hundreds of high schools and nearly all colleges and universities are turning out graduates exposed to minicomputers, and the Basic-oriented interactive programmers are not afraid to tackle the minicomputer.

This base of mini-oriented people is growing much more rapidly than the base of 1401 trainees of 15 years ago. Our culture is now becoming more mini-oriented and data processing professionals cannot afford to close their minds to the effective use of minicomputers especially in the next several years.

Software Still Is Mini's Real Bugaboo

By Ernest W. Aschermen
Special to Computerworld

Anyone who has attempted to utilize minicomputer technology outside the area of highly specialized technical/scientific applications (for which this technology was originally developed) is painfully aware of an acute shortage of software and software support, particularly from minicomputer vendors. At this point in the evolution of the minicomputer industry, certain basic software is available from vendors, but most must be obtained from software or systems houses and/or be developed by an in-house technical staff.

	Time-sharing	Process Control	Communications	Business Applications	Governmental Information Systems	Software Development	Front-End Processor
Hardware Diagnostics	*	*	*	*	*	*	*
Basic Software Required		*	*	**	*	*	**
Compilers				*	**	**	
"Basic" Languege	*						
Utilities		*		**	*	*	
Stand-Alone Operating System		*	*	**		**	*
Disk-Based Operating System	**			*	*	*	

* – Required ** – Advisable

General Software Requirements by System Function

As a result of this situation, both the basic decision to utilize minicomputers and the decision regarding which vendor to select requires considerable evaluation by the prospective purchaser regarding software and software support availability and quality.

For those users with experience on the "maxi" computers, the most obvious deficiency in the software area is in vendor-supplied systems. While many of the manufacturers provide excellent hardware systems, few provide excellent software to support their equipment, and none provides the wide range of software typically available from "maxi" vendors.

There are many reasons for this deficiency, three of which could be noted as most significant. First, minis have not been used for more than a few years outside the area of scientific applications; therefore there hasn't been much time to develop a large repertoire of software.

Second, most vendors have not had or have not chosen to develop the financial

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Cover photo showing part of the minicomputer shipping area at American Used Computer Corp. in Boston was taken by V.J. Farmer, editor of the special report on Minicomputers and Small Systems.

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Software Barriers Will Be Broken Soon

(Continued from Page S/3)

and manpower resources required to develop and then support a wide range of software.

Third, there has been such a diverse range of uses for minicomputers that it is difficult for the vendor to determine in which direction its major market exists.

Fortunately, the rapid expansion of minicomputer utilization means we can expect to see a dramatic increase in software available from the vendors and systems houses, thereby making the process of system selection easier. In the meantime, the following outline of required and available software may be of some assistance.

Basic Requirements

No minicomputer system can operate without a programming language, usually called assembly language. Assembly is a direct correlation of mnemonics and computer instructions, and is directly tied to the central processor's microstructure. As a consequence, few assembly languages are compatible with other machinery. To enter, edit, assemble and debug program code, the following programs are necessary:

- Assembler – a program to convert mnemonics into binary code, locate and flag errors and produce an output file.
- Editor – a program which permits alteration of existing code, entry of additional code or deletion of errors.
- Debugger – a computer program designed to permit selective, instruction-by-instruction debugging of assembly language programs without resorting to the use of HALT instructions or the console switches.
- Loader – a program which reads a binary file into memory and reconciles external (sometimes called global) variables. The result may be relocatable (usable anywhere in memory) or absolute (usable in a predefined place).

Further, software is required for use by the service engineer for testing purposes. In general, the customer does not get involved in modification of this software, but might use it for diagnostic purposes.

These basic software packages are currently available from all the hardware vendors. The quality of the software ranges from good to excellent, depending on the supplier. However, support for the software varies more radically from vendor to vendor.

Stand-Alone System

Those operations which require a dedicated computer, performing a dedicated task should probably be run under a stand-alone operating system, with or without real-time capability, as required. An operating system of this type should have the following characteristics:

- Able to control single or multiple tasks.
- Handle basic I/O between the programmer and the standard peripherals.
- Handle interrupts with software or hardware routines.
- Optionally control disk storage.

Disk Useful

It is useful, particularly to the software development team, to have a stand-alone operating system (real-time or batch) which is a subset of a full disk-based operating system. This permits the development of software on the disk system, and operation in the stand-alone dedicated environment.

Virtually all vendors offer some form of stand-alone operating system, though they vary considerably in capability and quality. Once again, support quality varies considerably.

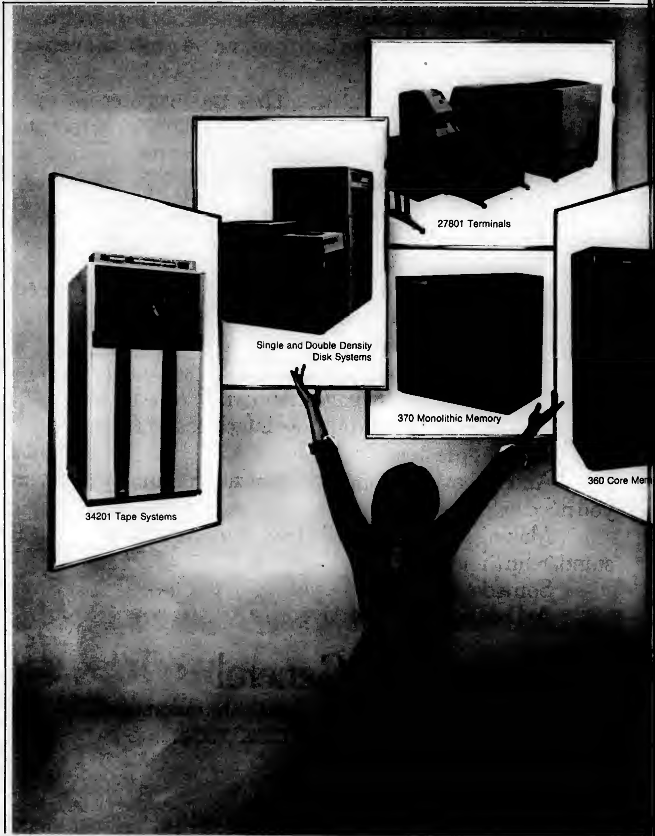
Most minicomputer vendors have versions of a disk operating system for control of batch and/or real-time tasks. In general, the disk operating system is an enhanced version of the basic stand-alone operating system,

(Continued on Page S/7)

Steps to Software Evaluation

When evaluating a system, the following steps should be taken:

- **Thoroughly evaluate the task to be performed and attempt to determine which programs, compilers, operating system, utilities and peripheral handlers are required.**
- **Determine from the vendor which pieces of software are available directly from or through systems houses.**
- **Ask the salesman for technical literature, a list of users, the date of initial release, the number of people actively supporting the system and the core requirements.**
- **Be sure that handlers, diagnostics and software documentation are included for all peripherals involved in the system.**
- **If qualified technical assistance is not immediately available, hire a consultant whose reputation is demonstrable.**



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The "dish" was prepared with an on-line, multiprocessing computer installed in November 1972 by Cut and Ready Foods, a Del Monte-owned processor and supplier to 3,000 restaurants in Northern California, San Diego and Reno, Nev.

"In addition to unifying our former bookkeeping systems used for fresh food accounting and various manual systema on the frozen side of our business, our recent computerization has produced several benefits," atated Wayne Hinders, controller at Cut and Ready. Among the benefits cited by Hinders that enhance both internal operations and the division's ability to

(Continued on Page S/10)

Higher Level Languages Best Bet, If Available

(Continued from Page S/6)

with the inclusion of:

- File handling routines.
- Disk handlers.
- A command language.
- Program swapping and/or overlays.
- Additional system overhead.

Most real-time operating systems (like Data General's RDOS or Varian's Vortex) have the capability to handle real-time tasks as well as batch tasks and development.

Compilers

Higher level languages such as Cobol, Algol, PL/1, Focal and Fortran require a compiler to convert the program instructions to assembly language, and are usually linked to an assembler for conversion to binary. Unfortunately, most minicomputer manufacturers do not have Cobol compilers, so transferability of programming from a large Cobol-oriented computer is definitely difficult.

Nevertheless the use of higher level languages can provide considerable savings in programming time and salary for programming personnel. The user should be aware, however, that compiler languages generally run slower than assembly language (often considerably slower), due primarily to the indirect addressing structure, and that compiler languages are most often not compatible between machines of different vendors. Most vendors do have some combination of Fortran, Algol, RPG and PL/I.

Most minicomputer vendors do not offer utility packages, such as Disk Dump, Core Dump and Sort/Merge. The most critical of these, the Sort/Merge, must either be customer written or procured from a systems house or fellow customer. It is quite simple to underestimate the use and need for these programs, until the system is installed and development begins.

One of the major uses of minicomputers, and a distinct set of programming, is involved in time-sharing. Most vendor-supplied time-sharing systems are written to utilize Basic language, with some vendor-supplied enhancements. In general, the entire system is vendor supported.

In evaluating these systems, it is particularly important for the prospective customer to contact other users to verify vendor sales information. Further, the utilities programs included with the basic system should be evaluated, especially if time-sharing use in an educational environment is anticipated.

Vendors rarely offer any applications packages, and so far the offering from systems houses is fairly specialized, especially for commercial applications. Therefore, original work is often required either by an in-house staff or a software consultant. Exceeding care must be taken in selecting a consultant or in preparing to accomplish the job in-house, because relatively few programmers exist with extensive experience on minicomputers.

Many manufacturers have organized user groups which offer to share software, but their existence is often a secret to the first-time user. Also, most often the needed "package" is not quite what is actually needed.

E.W. Ascherman is vice-president for programs and services at Environmental Data Planning Associates, Inc., Atlanta, Ga.

This chip
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It makes all the
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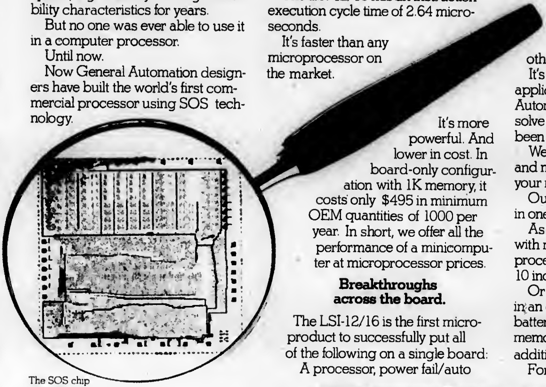

The SOS chip magnified 21 times

They've placed 2000 gates or the equivalent of 4000 to 5000 transistors on a single semiconductor chip.

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In the past this kind of size reduction always meant you had to make major concessions in performance.

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The LSI-12/16 has an instruction execution cycle time of 2.64 microseconds.

It's faster than any microprocessor on the market.

It's more powerful. And lower in cost. In board-only configuration with 1K memory, it costs only $495 in minimum OEM quantities of 1000 per year. In short, we offer all the performance of a minicomputer at microprocessor prices.

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The LSI-12/16 is the first microproduct to successfully put all of the following on a single board: A processor, power fail/auto restart, remote cold start, 16 bit parallel I/O interface and up to 2K bytes of semiconductor memory.

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Replaced Bookkeeping Machines

Del Monte Subsidiary Content With Small Computer

(Continued from Page S/7)

serve its institutional trade are:

- One-time data capture during order-processing for subsequent and automatic preparation of invoices, accounts receivable and commodity profit/analysis reports.
- Customer convenience of a combined invoice and statement for all product lines.
- A more comprehensive commodity analysis, which now includes all products and their profit margin status on a weekly basis.
- Direct and immediate access of current status of operations – manual and time-consuming reference of files, which were updated less frequently, was formerly required.

Adoption of the system, which replaced bookkeeping machines and manual systems at Cut and Ready, did not require a net increase in personnel but the center operates on two shifts.

The System Ten computer, produced by the Business Machines Division of The Singer Co., costs Cut and Ready $3,200/mo ($110,000 purchase price equivalent) for a configuration which includes:

- CPU with 48K characters of memory.
- Three CRT terminals.
- One I/O console.
- One 450 line/min printer.
- Three disk drives with a total storage capacity of 30M characters.

Currently it requires 15 advance salesmen and 25 drivers to keep Cut and Ready's 3,000 customers stocked with more than 300 items the division either produces or jobs.

Invoices are prepared the night prior to delivery for preordered items, primarily frozen foods. Item codes and product descriptions of an account's anticipated needs of Cut and Ready's fresh food "build up" stock are also machine-printed on the same invoice.

This anticipation is based upon an account's past usage, filed on disks. The driver extends unit prices for any items selected by the chef from the truck's "build up" stock. Thus Cut and Ready's customers receive invoices for all items as they are delivered whether preordered or selected upon delivery.

The day following delivery quantities representing "build up" stock are entered through the CRT terminals into an account's file, completing the input cycle for commodity analysis and accounts receivable reports.

Prior to installing the computer, weekly commodity analysis reporting lagged two weeks behind the present schedule. As with the order-processing and invoicing system the new report unifies both fresh and frozen food accounting.

System Handles 'Isolated' Problem

Cut and Ready, a Del Monte subsidiary, uses a small Singer business computer to handle its data processing. And Del Monte plans to keep the small system there even though its main center could probably handle the load.

Del Monte's main system is a recently installed IBM 370/158 with 1M bytes of memory and uses VS2 with Hasp and RJE. Singer 4100 terminals are currently used in seven remote locations for batch operations of applications related to the canning business.

But when Cut and Ready needed extra computing power several years ago, Del Monte just didn't have the manpower or facilities then to easily help Cut and Ready. "The applications needed at Cut and Ready looked like they could be put in as a turnkey system . . . We just didn't have the applications packages we could supply without significant amounts of system analysis and programming," a Del Monte source said.

And with Cut and Ready's system now working well, Del Monte has assigned a low priority to bringing the subsidiary's data processing on-line to the main center.

Isolated data processing operations such as Cut and Ready are not unique at Del Monte; several other subsidiaries use Burroughs 1700 small systems, and the remote DP power provides local control.

Enhancements include reporting sales volume in units in addition to dollars, profit margins by item within sales and route territories and cumulative results carried forth on a quarter-to-date basis. Spoilage and sample quantities are also identified on the new commodity analysis report.

"We now have no problem identifying changing profit behavior of products in any route or sales territory on what is almost a real-time basis," Hinders said. One of the most valuable uses of our new commodity analysis report is to be able to make judgments on discounting slow-moving, low-margin items. The rest of the line no longer bears the burden of its disproportionate overhead," he noted.

Among other applications currently run on the division's computer are accounts receivable and payroll. An aged trial balance is an automatic by-product. Federal and state payroll deduction tables are also disk-filed.

Input for the system is by CRT terminals. "Considering our volume on sales orders only – approximately 2,400 line items daily – we projected a minimum sorter load of eight hours daily with punched card input," stated Hinders. "Why shove all those cards around? Also we think it's easier for operators to correct their errors if they do not have to retrieve a card," Hinders explained as the reason he didn't go to punched cards.

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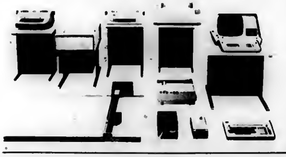

Even if you call the Wang System 2200 a small system . . . you have to admit it's a big idea.

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Minis Answer Counties' Needs

ASHEVILLE AND BUNCOMBE COUNTIES, N.C. – The information handling needs of small communities often grow much faster than their budgets. But this joint community of 60,000 has managed to develop over the past three years an on-line information system which fits both the people's needs and their pocketbooks.

The Asheville/Buncombe County Information System (Abis) is different from most data processing systems found in local government in that it is a fully planned, integrated system which nevertheless offers the benefits of a decentralized system, and Abis uses only minicomputer technology which results in "maxi savings," as Larry Fisher, director of finance, put it.

The ultimate goal for Abis is to have satellite minicomputer installations located in various departments and connected via direct or modem-controlled communication lines to a central minicomputer.

Each satellite will perform certain dedicated processing operations under direct departmental control. The central configuration will store large-scale data files (accessible via satellite), control the communications system and perform large-scale processing operations.

Though at the outset this satellite approach was met with some skepticism, so far local officials are pleased with the results of Abis. The city council recently voted to add $48,000 to the Abis budget for further expansion, leaving the city's total investment still under $200,000, the majority of which reflects nonrecurring hardware and software costs.

Abis is planned to perform a comprehensive set of "operational" functions including utility billing, payroll, accounting, tax assessment and billing, student accounting and scheduling, inventory control and purchasing and building permit processing. Also, the system is designed to take advantage of the data collected by such operational functions and provide information for planning and management purposes.

Designed by Environmental Data Planning Associates (EDPA) of Atlanta and developed jointly by EDPA and the Abis staff, implementation of the central configuration is complete. Abis is processing payroll for 1,500 employees and utility bills for 32,000 accounts in an on-line, real-time mode.

A geographic base file consisting of digitized land, street network and structures data, and a graphic output system have been partially implemented.

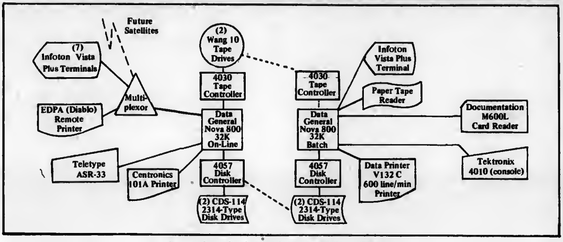
A land acreage calculation system and a population projection model have been implemented, and a full accounting system which complies with the North Carolina Uniform Accounting Act is under development.

Capabilities of the system include production of community profiles and graphic and tabular formats on land characteristics, transportation systems features, building conditions and population density.

Revenue and expenditure projections, cash flow monitoring and Pert/CPM are among other applications scheduled for future implementation.

A central Abis staff accomplished all systems and programming tasks, insuring overall system integration and eliminating the need for several costly data processing staffs, an expense few community governments can afford. Operations, once automated, can be accomplished mainly by existing departmental staff with little special training.

(Continued on Page S/14)


Future Satellites
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(2) Wang 10 Tape Drives
4030 Tape Controller
Data General Nova 800 32K On-Line
4057 Disk Controller
(2) CDS-114 2314-Type Disk Drives
4030 Tape Controller
Data General Nova 800 32K Batch
4057 Disk Controller
(2) CDS-114 2314-Type Disk Drives
Infoton Vista Plus Terminal
Paper Tape Reader
Documentation M600L Card Reader
Tektronix 4010 (console)
Data Printer V132 C 600 line/min Printer

Buncombe and Asheville Counties System Configuration

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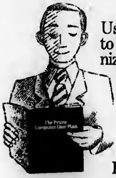

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Standard Processor Features

Prime 300 Central Processor (1 board)
Prime 200 Central Processor (1 board)
Prime 100 Central Processor (1 board)

- Virtual Memory – automatic paging, mapped address translation to 256K words, restricted execution mode, and memory protect.
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- Hardware Multiply/Divide and Double Precision Arith.*
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- Automatic Program Load From Input Devices (PTR, TTY, CR, MT, Disk)*
- Memory Byte Parity
- Processor Byte Parity
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- Multi-level Vectored Priority Interrupt System

* Optionally available on Prime 100 and 200
**Optionally available on Prime 200

The chart suggests there's a little 300 in every Prime computer. Naturally, we planned it that way. Our 300 is just the reverse of the big box with a little computer inside.

Other 300 features will tell you just how big it is. For instance, there's high-speed MOS memory with 32K words per board. Up to 256K words per system. There's floating point arithmetic and writable control store, too. In short, there's everything you'll need in the computer you can plan with. Work out a multi-function system or plan a multi-user arrangement. The diagram that follows is just one way to go.

The Prime 300 supports a multi-user, virtual memory Disk Operating System (DOS VM) and a foreground/background Real Time Operating System (RTOS VM).

A Prime 300 with virtual memory easily accommodates over a dozen users. What's more, each is guaranteed 64K words of virtual memory available to program in FORTRAN, BASIC, Macro Assembler and Micro Assembler.

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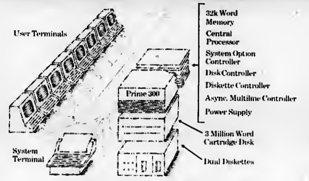
The Plan also goes into system integrity features. Memory Byte Parity and Processor Byte Parity are standard in the Prime 300. Micro-verification routines (also standard) and controller loop-back allow you to isolate faults to a single board.



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PRIME

Satellites Provide Local Control for County Jobs

(Continued from Page S/11)

Local officials speak enthusiastically about the minicomputer approach selected by their community. Several key considerations which resulted in the choice of minicomputers were:

- The hardware is relatively inexpensive when compared with a system leased or purchased from one of the major large computer manufacturers.
- Even though much of the software must be developed from scratch for Abis (few packages exist for minicomputers), total development costs are significantly less than the total hardware/software costs associated with the more expensive large machines.
- The central/satellite system approach permits local departmental control of most data processing, often an important political consideration.
- Even though some equipment and operational control is decentralized, the system is integrated because implementation follows a carefully designed development plan, all hardware is compatible, the communication system is controlled by the central configuration and the central Abis staff does most systems analysis and programming.

After a study of various hardware alternatives, the following equipment was chosen and is installed or on order. This represents the central configuration to date:

- 2 Data General Nova 800 processors (128K bytes, floating point, hardware multiply/divide)
- 4 CDS-114 (2314-type) disk drives and control (116.8M bytes, shareable by both processors)
- 1 Documation M600L card reader (600 card/min)
- Infoton Vista Plus Terminals (4,800 bit/sec, 4 remote)
- 1 Tektronix 4010 graphic CRT
- 2 Wang tape drives (45 in/sec)
- 1 Data Printer V132C line printer (600 line/min)
- 1 Centronics 101A printer (120 line/min used for backup)
- 1 Ed-1200 printer (remote, 30 char./sec)

This equipment is configured to provide full backup of the teleprocessing system during crisis periods, and to permit batch processing and on-line development concurrently during normal work hours.

The system will be connected, using the Data General shared disk technique (with IPB), but the current development activities preclude direct connection.

The Infoton Vista Plus terminals perform beautifully at 4,800 bit/sec at distances to 300 feet, but do seem to require some internal cooling, as they get quite hot under constant (10 hour/day) usage, according to Ernest W. Ascherman, director of system services at EDPA.

Contrary to the norm with minicomputers, the Century 2314-disk drives have greater reliability than the cartridge system which was used as an interim disk storage media.

"Once the entire disk system is "set up" and checked out, they seem to remain stable longer and have less problems than the cartridge type," Ascherman said.

In the future, the satellite systems are planned to have Nova 2/10 processors of varying sizes depending on the particular applications, various I/O devices and in some cases local storage devices.

Data General provides a real-time disk operating system (RDOS) which has worked exceptionally well for Abis, Ascherman said. However, additional support software such as Sort/Merge, Teleprocessing Monitor, Disk Dump and Core Dump is not normally included in the manufacturer's software package.

As a result, considerable time was spent in the development of this utility software, particularly the Teleprocessing Monitor. The monitor is a single threaded TP monitor (similar to Faster) which operates in conjunction with the operating system to control the on-line terminals.

Standard functions, including overlay calling, logging and CRT authorization checking are included in the monitor, while the CRT function handling is included in the appropriate moni-

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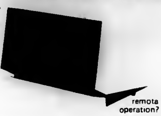

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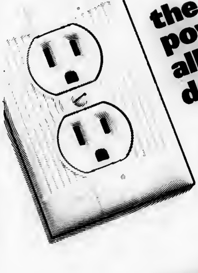

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Consider the Mini Alternative

Upgrading to a Larger CPU Is Not the Only Answer

The following article was excerpted from the Auerbach Data Processing Manual, published by Auerbach Publishers, Inc.

Many data processors accustomed to large-scale computers who face the need for additional computing power have not given consideration to minicomputers as a viable alternative. But the DP manager should take a hard look at minis when his present computer is loaded to capacity.

In an installation whose computer is saturated there are theoretically five basic alternatives:

- Order a bigger/faster CPU from the present vendor.
- Eliminate some applications.
- Use a time-sharing service.
- Get a bigger/faster CPU from another vendor.
- Get a minicomputer.

Ordering the next larger size computer can be a traumatic experience – especially for the treasurer. In most hardware lines, the cost of stepping up to the next size CPU is usually $4,000 to $5,000 a month unless you are on a fixed-term lease plan, in which case the penalties will make your hair turn grey.

The advantage of stepping up within the vendor's line of hardware is that conversion costs are kept to the minimum, provided the same operating system is used. If you must go to the next operating system the vendor offers, reprogramming costs are minimal but the cost of converting the job control, utilities and files may be surprising.

Eliminating applications is extremely difficult because corporate managers generally object strongly when something is taken away from them. Obviously it is only possible to eliminate nonessential applications. Even if an application is absolutely useless and the system output goes directly from the line printer to the trash can, no manager in his right mind will let it be implied that his area of concern is either useless or wasteful.

The DP manager who tries to eliminate applications runs a risk of eliminating his own job. This is not to say that applications cannot be eliminated; the weeding-out process might be a job for an outside auditor who is uninvolved with the internal politics of the organization.

Time-sharing services can be a good alternative to more in-house computing power, particularly if the installation has applications with relatively little input and output that do not require substantial on-line data bases. Unfortunately, most business DP applications have characteristics that make them unsuitable for time-sharing. This is particularly true of firms large enough to fully utilize a large in-house computer.

In the commercial environment, time-sharing is best used to handle peak workloads of an occasional or seasonal nature, engineering computations, the processing of work pertaining to remote branches and warehouses, and to run special applications such as operations research programs which are too big to handle on the in-house system.

In spite of the exclusive use of compiler languages in an installation, changing vendors can also be quite traumatic (to the user, not the treasurer). Reprogramming and retraining of operators and programmers can wreak havoc with production schedules and overtime budgets.

The transition period from one vendor to another is always a frustrating experience if it is discovered that documentation is either lost or inaccurate, the new system has random files that require relative addresses rather than physical addresses, or the two computers have different collating sequences so that every comparison in every program must be analyzed on an individual basis.

There is little trauma involved in adding a mini to an existing installation because most of the work currently being processed on the big system remains on it, and work run on the mini either hasn't been performed previously or is currently being performed in a satisfactory manner on the large computer.

Furthermore, there are no pressing deadlines for conversion. The challenge of a new machine will stir the tired blood of even the most senior programmer, and the additional tender loving care from the vendor of the big system is always welcome.

Many businesses have potential computer applications which are not automated because of the level of secrecy that management wishes to maintain in rela-

(Continued on Page S/16)

Dual System Solves Twin Counties' Needs

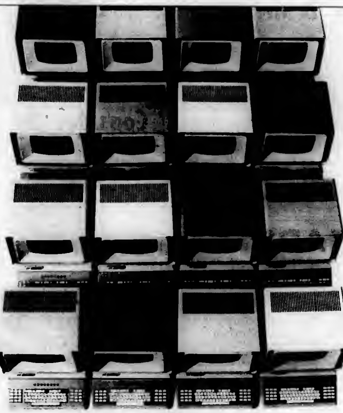
(Continued from Page S/14)

tor application overlay. A multi-threaded monitor is under development.

A data management system is in the design stages. This system will augment the fundamental sequential, random and contiguous file structures included in RDOS.

All system software has been written in Assembly Language and the application packages in Assembly, Algol and/or Fortran IV. Needless to say, the fact that Cobol is not yet available on the Nova computers may be viewed as a limitation to the generalization of this approach, but it has not in any way hampered progress in Asheville, Ascherman noted.

One of Ascherman's complaints about Data General is that the company provides almost all of its software on paper tape. "While this is fine for the small user, it is hell for people who have to rebuild a critical system in a small time," he said.



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Military College Selects In-House Mini for T/S Use

By Patrick Ward
Of the CW Staff

NORFOLK, Va. – The Armed Forces Staff College here is relying upon a mini-based time-sharing system to handle its educational and administrative needs, and so far the mini system is a big improvement over the service bureaus used before.

The staff college provides a five and a half month course to qualify officers from all service branches and some foreign countries, along with some civilians, in joint [cooperative between the different services] operations military planning.

Each class is divided into 15 seminar groups of about 18 students each, and instruction is given in a series of "blocks."

By the time they are through the third block, all the students are trained to work with the computer system in Basic. From then on their assignments require use of the computer as a decision-making tool.

The college had used nine Model 33 ASRs to access local T/S service bureaus.

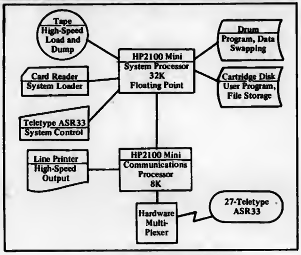
However, the college encountered problems in relying on service bureaus. For example, one threatened to go out of business during the middle of a school semester.

Because of the bureaus' hourly charges, the college also faced tight budget constraints on computer use, according to Colonel F.J. Long, director of the college's Evaluation and Data Systems Group.

"It also made a hell of a scheduling problem to try to get that many seminars through" on nine terminals, Long said.

"And then we had already planned on automating other blocks of instruction which would have been prohibitive under the old system," he added.

(Continued on Page S/18)



Armed Forces Staff College Configuration

Consider the Minicomputer Alternative

(Continued from Page S/15)

tion to sensitive areas of the business. Executive payrolls, the purchases and blending recipes for "secret ingredients" and secret formulas, the investment account holdings of a brokerage firm or large financial institution, geological research data of an oil company and the marketing forecasts for new products are typical.

The majority of these and other "top secret" applications can be implemented on a mini costing less than $50,000 for outright purchase. If secrecy is worth $60,000 (allowing for programming) to management, a mini is the answer.

In installations that want to establish remote terminal processing on either a remote batch or a demand basis, a mini is generally a better, less expensive alternative than loading down the existing computer with communications processing. Also, the mini is sufficiently flexible to adapt to interfacing with the next large-scale computer that is installed, as well as the current computer.

If on-line entry into the data base is required, a mini provides a more complete validation of data and an emergency backup in the event of a CPU failure in the larger system.

The concept of a dual base is also worth considering for such applications as accounts receivable where on-line credit inquiry is desired. A mini can process all inquiries from sales and accounting clerks, and all sales and payments are processed by the mini as they occur.

Periodically the large-scale system "asks" the mini for the transactions processed since the last time the large system processed accounts receivable. The large-scale system then treats the mini like a tape drive with a transaction file.

This concept permits processing of accounts receivable (or a similar application) completely independent of the large-scale system except for the preparation of statements and periodic reports.

A dual data base system is ideal for an installation making the transition from a batch to an on-line system. It permits the large-scale computer to continue running the application as it currently exists with no increase in the processing load, and it permits the economies a mini makes possible.

Minis are frequently the most economical alternative for organizations with branch warehouses that require data processing service with less turnaround time than a central facility can provide. This can be accomplished without using a costly communications network.

The mini can handle order entry, customer billing, warehouse pick-slip preparation, shipping documents and inventory accounting for the branch. Each night it communicates summary accounting and sales information to the large-scale system so that the large system can perform automatic reordering and sales analysis functions.

If the organization uses decentralized as opposed to centralized accounting, then the mini can also perform the bulk of the accounting processing of the branch operation.

While the mini is not intended to be a high-volume batch processor (based on the peripherals available), there are many applications in the typical installation whose printing requirements, in relation to total run time, are small enough to permit their being run on a minicomputer.

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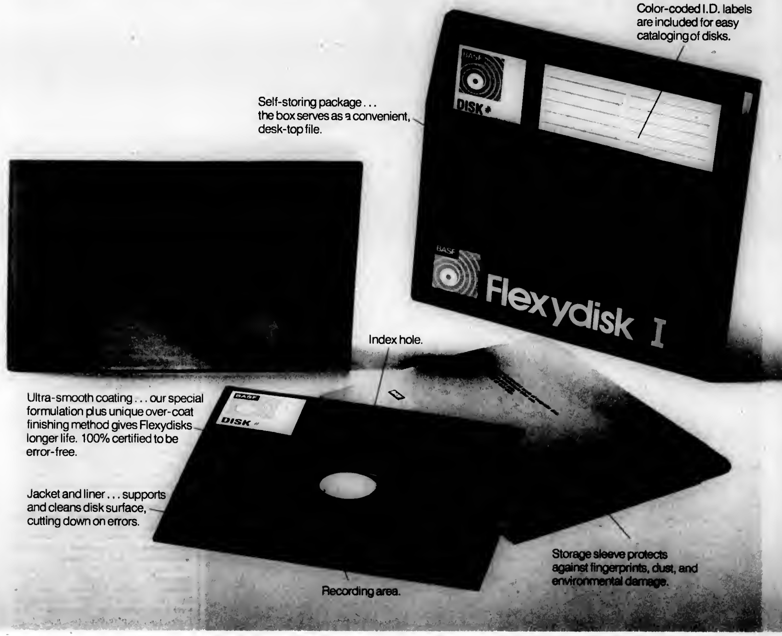

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In-House T/S Replaces Bureau

(Continued from Page S/16)

The staff decided that an in-house computer was economically more feasible than external contract services and submitted a request to the Navy's Automatic Data Processing Equipment Selection Office (Adpeso) for a system with 32 ports and 32K of expandable storage.

Hewlett-Packard was the only "responsive bidder," according to an Adpeso spokesman, and the college installed an HP 2000F Time-Sharing System in September 1972.

Connect Time Jumps

The last class before the computer was installed had been limited to 1,350 hours of service bureau connect time.

"The very first class after we had put the computer in, usage jumped to 3,200 hours, the next class to 4,200, and the next class to 5,200. With the current class just graduated our time was up to 8,000 some odd hours," Long remarked.

The minicomputer system can provide time-sharing for up to 32 students at once. There is now a Model 33 ASR in every one of the 15 seminar rooms. Nine others are located in another room for class instruction. A neighboring government installation has three more accessing the computer through Omnitec couplers.

Although the college uses HP time-shared Basic for its educational program, the computer could also be used to teach Fortran, Algol or Assembly language, Long noted.

But he added, "We really like Basic because it's so easy for managers and non-DP people to program."

However, the school does use Fortran for much of its administrative work.

Students Rate College

Other than the educational time-sharing the system provides 23 hours a day, the college uses the system to print out student evaluations of everything from class content to library service.

Students grade the instructional content of every hour they are in school on a scale ranging from one to five. They also rate their administrative and academic support in the same way.

Each day, every student marks a card with his identification and seminar number and the ratings.

The student indicates his evaluation of the coverage of a particular subject and its usefulness to him personally.

Ratings are tabulated and statistically analyzed by the HP system for review by college officials by 9 a.m. the next morning. The cards are sorted according to service groupings (i.e., Army, Navy, Air Force, etc.) to determine the value of the instruction to each service. Each week, summary reports are prepared.

Since batch entry and time-sharing cannot be done concurrently on the computer, the college uses a time-sharing optical card reader to input class evaluation data through a time-sharing port.

In addition to numerical evaluation cards, students also complete comment cards that can recommend changes to the instructional blocks. Students evaluate their administrative support halfway through the course and again at the end.

The staff is presently automating equipment and supplies inventory records. Many of the inventory control programs will also be used for ordering.

Staff members plan to develop the necessary inventory programs and to teach administrative personnel to enter data and obtain their own reports.

The Army Staff College's HP system leases for $3,472/mo on a five-year lease, with a basic monthly maintenance contract charge of $860/mo.

83 Users Generally Happy With Small Business CPU

• Hardware—Great • Maintenance—So-So • Technical Support—Weak

By Brian L.J. Callahan
Special to Computerworld

In the price/performance range between conventional accounting machines and full-fledged computer systems, there is a class of data processing equipment that is currently filling the needs of thousands of small businesses. Although these "accounting minicomputers" employ a wide variety of programming and storage techniques, they are typically characterized by purchase prices in the $5,000 to $75,000 range, modest internal processing capabilities and a strong emphasis upon direct keyboard input and low-speed printed output.

To assess the current level of user satisfaction with accounting minicomputers, and to determine what business applications are being successfully implemented with them, Datapro Research Corp. recently conducted a survey of users of such systems. Responses were received from 83 users of accounting minis with a total of 142 installed systems.

In cases where more than one system was installed, the systems were generally from the same vendor. This approach is readily understandable, since it spreads the program development and training costs over as wide a base of compatible systems as possible.

Seven questions were asked in the survey to assess the level of user satisfaction: "How would you rate the overall performance of the system?", "How would you rate its ease of programming?", "How would you rate its ease of operation?", "How would you rate the system's reliability?", "How would you rate the maintenance service provided for the equipment?", "How would you rate the manufacturer's technical support?" and "How would you rate the manufacturer's software?".

Totaling the responses to all seven questions for all systems, the results were as follows:

Rating	No. of Responses	% of Total
Excellent	128	35
Good	248	43
Fair	85	18
Poor	31	8

Thus, the survey indicates a fairly high level of satisfaction among the users of accounting minicomputers, with 78% rating their systems generally good or excellent.

Breaking the responses into individual percentages, the following categories show user ratings for each question:

Categories	Excellent	Good	Fair	Poor
Overall performance	38%	53%	7%	2%
Ease of programming	35%	43%	17%	5%
Ease of operation	55%	39%	5%	1%
Hardware reliability	44%	38%	14%	3%
Maintenance service	33%	48%	17%	1%
Technical support	18%	37%	34%	13%
Manufacturer's software	23%	43%	23%	11%

From this profile it is clear that respondents were most satisfied with the operation and hardware reliability of accounting minicomputers. Slightly less satisfying were the respondents' ratings given to overall performance, maintenance service and programming ease.

However, in the categories of technical support and manufacturer's software, 47% and 34% respectively rated these categories only fair or poor. Apparently, the users of accounting minicomputers are saying two things: First, in order to keep me as a user, vendor, improve your technical support and software. Second, prospective users should recognize where vendors can improve their product offerings.

Among the specific strengths and weaknesses noted by two or more users were the following: Burroughs L Series – ease of use and relatively low cost (6 mentions each), slow operation or low throughput (4 mentions); IBM System/3 – relatively low cost (3 mentions), ease of operation (8 mentions), inefficient or poor systems software (4 mentions), and incompatibility with other systems (2 mentions).

In general, most users stressed low cost and ease of use of their systems, while users of the more powerful minicomputer-based systems frequently revealed their transitory status as upward-migrating installations by grumbling about system throughput limitations and lack of system flexibility.

The applications for which accounting minicomputers are being used

Applications	No. of Users	% of Total
Payroll	31	17
Accounts receivable	30	18
Invoicing/billing	18	8
General financial administration, including cash receipts journal, accounts payable	22	12
General ledger	28	14
Inventory management	18	10
Special industry applications, including securities/banking, distribution, medical/dental, sales analysis	18	10
Miscellaneous (costing, remote job entry)	11	8
Order entry	12	7

Payroll accounts receivable/payable and general ledger were most often combined as principal applications by the users.

The users were also asked who wrote the programs for their applications with the following results:

Programming Done By:	No. of Users	% of Total
In-house personnel	48	58
Manufacturer personnel	12	15
Ready-made programs	2	2
Other (consultants)	1	1
Combination (two or more of above)	18	24

In reply to the question, "Our annual budget for salaries, administration and maintenance (exclusive of hardware

(Continued on Page S/20)

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Small CPUs Offer a Wide Spectrum of Applications

By Brian L.J. Callahan
Special to Computerworld

Accounting minicomputers are designed primarily to serve the business data processing needs of small companies. For many of these small companies, a business minicomputer – when properly selected, installed, programmed and operated – can lead to far smoother operations and higher profits.

In addition to processing routine transactions, such a minicomputer can provide reports that give management the information it needs to achieve improved customer service, reduced inventories, tighter cost control and increased production efficiency. But in far too many cases, computers are poorly chosen, misused and misunderstood, so they actually become liabilities rather than assets.

The best way to guard against this type of disaster is through a thorough management training program in the principles of DP. But since few small-company executives have the time or desire for such training, the best alternative is to seek competent outside advice in the selection and installation of an appropriate computer system. An excellent starting point for obtaining effective outside help is likely to be an industry, trade or professional association.

In addition to their use mainly in small companies, low-cost minicomputers are also being productively used in some of the nation's largest corporations in a variety of specialized applications such as:

- Local processing of some or all of the data generated in branch offices, divisions and/or small subsidiaries.
- Individual "dedicated" applications that involve extensive keyboard input and printed output, such as the preparation of accounts payable checks, insurance claim checks and stock transfer certificates.
- "Intelligent terminal" applications in which the minicomputers perform both local data processing functions and communications control functions in company-wide data communications networks.

As to the future potential for mini-based systems, industry experts have estimated that in the U.S. there are currently more than half a million businesses or other organizations employing fewer than 150 employees. The following list provides a view of just what applications can potentially be undertaken by small mini-based business systems.

- 5,000 CPA/auditing firms, with applications for client billing and preparation of balance sheets and income statements.
- 22,500 automotive industry dealers, for monitoring parts sales, new and used car sales, dealer trades, service and repair accounting and vehicle inventory.
- 4,500 baking and bottling companies, for handling route settlement, computing driver commissions, compiling data sales reports and performing vending machine accounting.
- 11,500 banks, commercial and savings, for processing savings accounts and mortgage and trust accounting.
- 9,000 savings and loan associations, for savings and mortgage accounting, escrow analysis and dividend processing.
- 80,000 building and other types of contractors, in such applications as estimating, job costing, maintaining equipment records and daily labor reporting.
- 14,500 educational institutions, for keeping student records and handling appropriations accounting.
- 1,500 hospitals, for maintaining inpatient records, insurance billing, revenue analysis and census reporting.
- 14,000 hotels and motels, for keeping track of departmental costs and maintaining the city ledger.
- 12,000 insurance agencies, for such applications as premium billing and computing agents' commissions.
- 6,000 laws firms, for maintaining time records and performing client accounting.
- 13,000 labor unions, in such applications as membership accounting.
- 125,000 manufacturing companies, for job costing, keeping track of work in process and work center loading.
- 8,500 municipal, state and county government offices, for tax billing, utility billing and appropriations accounting.
- 15,000 printing and publishing companies, for advertising and circulation billing.
- 200,000 retailers, for cycle-billing operations and inventory control.
- 2,500 stock brokerage firms, for computing sales commissions, maintaining position records and preparing purchase and sale confirmations.
- 46,000 transportation companies, for revenue analysis and compiling freight bill statistics.
- 115,000 wholesaling firms, for order billing and sales analysis.

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A look at automatic consumer systems – in our April 24th Autotransaction Supplement

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Ron will examine current systems · what they do for the users, and what they mean to consumers. He'll have case studies and interviews with autotransaction users. And he'll take a look at the future of this infant industry.

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Survey Discovers Small Machine Users Generally Satisfied

(Continued from Page S/19)

costs) for *each* of our small accounting computer systems is approximately:", the 54 users who responded supplied the following data:

Lowest figure: $2,000
Average figure: $59,532
Highest figure: $350,000

In response to the question, "During 1974, we expect to acquire these additional small accounting computers:", 20 respondents (24%) indicated they would be obtaining more such systems. Of these respondents, five out of six current Burroughs users are continuing with Burroughs equipment, and all but one IBM user (i.e., nine of 10) are continuing with IBM equipment.

Litton, NCR, Philips and Singer users also plan to continue to buy from their present suppliers.

Brian Callahan is managing editor, Datapro Reports on Minicomputers, Datapro Research Corp., Delran, N.J.

PDP-8 Handles Heavy 'Course' Load, Mixed Applications at Ripon College

By Robert L. Taylor

Special to Computerworld

RIPON, Wis. – A minicomputer may be small but its applications can be unlimited, especially in a college environment.

Ripon College here installed a DEC PDP-8/I in August 1970 to provide students with a computing facility which would familiarize them with computer concepts and programming, and allow problem-solving within their specific academic areas.

A secondary, although important, purpose was to develop data processing applications for the college's administrative offices.

Ripon began its Time-Sharing System (TSS)/8 operation with six terminals and a nucleus of faculty and students who had previous experience with computers. Some had used the PDP-8/L purchased a year earlier by the Physics Department.

Since then, student interest and usage of the TSS/8 has grown tremendously. More than 40% of the college's 1,050 students actively use the computer, either directly as part of a computer science or mathematics course, or as an adjunct to another course. The college now has 12 terminals on campus, all tied into the PDP-8/I, and many of the terminals are available to the students practically 24 hours a day on an "open shop" basis.

Every math student is introduced to computer programming in his first course and uses programs throughout the basic sequence of courses. The mini is used for: elementary number theory, graphing and solution of polynomial equations in precalculus mathematics; limits, Newton's Method, series evaluations and approximation of definite integrals, including the Trapezoidal and Simpson's Rule in calculus; and simultaneous equations, matrix inversions and Eigenvalues in linear algebra.

The Chemistry Department currently offers a course in computer applications in chemistry in which students write programs involving iterations, integrations, reductions and analysis of data.

An organic literature search program has been developed which uses a tape library of over 800 compounds, and disk files as extended memory. The program will match inputted experimental data (boiling points, melting points, infrared bands, answers to simple chemical tests) with the library compounds, and give the literature reference as output.

In addition to the traditional problem-solving uses of the computer, the Physics Department has initiated some novel and quite useful applications during the past year, especially in the area of tutorials for students taking beginning physics courses.

Programs have been developed which demonstrate the concepts of limits, area under a curve, trig functions, resolution of vectors and the use of Taylor series to represent functions. These programs have the unique feature of saving comments by the students which the instructor can later retrieve, together with the number of times the program has been run.

Quiz programs have been written which allow multiple choice questions to be asked on various subjects. The program tells the

(Continued on Page S/22)

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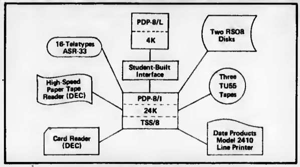

System Configuration at Ripon College

Mini Handles Heavy Load

(Continued from Page S/21)

student the number missed and the correct answers.

Although most applications of the computer involving linguistic analysis require large amounts of core memory, the Language Departments at Ripon have used the PDP-8/I to provide an impressive demonstration of the use of grammatical rules in sentence formation. With a basic vocabulary of only 20 expressions and a program in Basic of only 54 statements, a total of 6,525 different German sentences, all meaningful and grammatical, were produced.

Utilizing the data storage and manipulation capabilities of the TSS/8, the Economics Department has developed an advanced stock market and commodity seminar. The three main objectives of the course are the collections, processing and analysis of stock data.

Data collected includes the daily closing prices of the 115 stocks of Worden and Worden's Service, the 200-day moving average of each stock and the weekly group relative strength indices for each industry in the market.

Ripon students have designed and constructed an accumulator linkage, or interface, between the college's PDP-8/L and PDP-8/I to allow the two computers to "talk" to each other. Through this device, data can be transferred in either direction, facilitating the use of the 4K memory on the PDP-8/L as another peripheral device, or as a separately running program.

Student-written software for the interface includes a loader which loads the PDP-8/L from any of the three possible PDP-8/L storage devices (Dectape, disk or paper tape) in either RIM, Binary or Save formats.

Over the past two years, systems have been developed for the admissions, alumni and registrar's offices.

Every contact or inquiry about Ripon College by a prospective student is recorded on tape. Between 8,000 and 9,000 inquiries are anticipated each year. This operation requires daily input of information on each inquiry, and a printout of file cards for reference by the admissions office.

The information includes name, address, telephone number, high school, academic and extracurricular interests, SAT or ACT scores, etc., and is used by the admissions counselors in planning high school visits and in contacting high school students who are interested in the college.

Annual donation information is currently maintained on tape for each alumnus for the past five years. Plans are to continue recording each year's giving so as to continually maintain at least a 10-year giving history.

The records are coded by geographic area and class year to enable the alumni and development offices to recognize contributions made by alumni and to identify potential donors within a specific level of giving, geographic area or class year.

The principal applications for the registrar's office are the processing of the students' course registration, and the computing and printing of grade reports at the end of each semester. A student information file is maintained on tape for use by various administrative offices, and is also used to print the annual student directory.

R.L. Taylor is Ripon's director of computer services.

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TEXAS INSTRUMENTS

Dissatisfied With System/3? Here's an Answer

By Jon David

Special to Computerworld

No computer system is ideally suited to every application, and the IBM System/3 is no exception. Many users have voiced dissatisfaction with the System/3, with complaints ranging from overly expensive hardware, poorly designed systems approach and inefficient programming to the inability of users themselves to properly define their situations or evaluate computer systems.

As is the case with any computer installation, dissatisfaction can be treated in one of two basic ways: improvement or replacement. If a user decides to improve his System/3 installation, he can replace IBM hardware components with plug-compatible equipment to realize lower costs, or he can improve performance by either reprogramming particular applications or redesigning his entire approach to the application.

Users traveling the replacement route can select either an equivalent system from another manufacturer or systems house, or a compatible replacement from any of several sources.

The wide acceptance of IBM's 360 Series created a successful news industry: plug-compatible peripheral devices.

The System/3 is, of course, much newer than the 360s, but a similar set of plug compatibles is presently offered, and a System/3 user has a wide choice of plug-compatible disks, memories and printers.

A reliable axiom of the trade is, "The more general a package, the less efficient it is for particular situations." A typical System/3 user has his software created as modifications of one or more of IBM's basic software packages for particular industries and applications. Thus, the programming is not only an adaptation of general packages, but the basic systems approach is imposed on the user by the package[s] being used.

A review of the system operation might well lead to a restructuring of data files, a resequencing of operations or similar reallocation of resources on a systems level to provide greatly improved processing.

Reprogramming particular applications can also provide improved performance, but can be dangerous if performed by anyone not expert in both the computer system and application, and costly if consultants need to be used. A cooperative association of System/3 users such as Nasu can sometimes provide particular program improvements to its members, but these programs might require some modification to be properly fitted to a particular user's situation.

Users seeking comparable systems are inundated by a plethora of devices touted by their salesmen as programmable calculators, business minicomputers, accounting machines, intelligent terminals and "true" minicomputers. Regardless of the name, particular devices or systems may have the capability to perform the jobs assigned to a System/3.

Many systems houses have "turnkey" business systems based on proven minicomputers such as PDP-8s and 11s and Novas.

Both minicomputer manufacturers and systems houses offer business-oriented languages (although none yet offers Cobol) such as Dibol from Digital Equipment Corp. for its Datasystem 300 series; non-IBM compatible RPG from Varian; and Business Basic from Basic/Four. Honeywell, Singer, Burroughs and others also offer competitive systems.

An ideal situation for some would be to find a total system from a non-IBM source that would have the same configuration, accept the same programs and improve performance while costing less.

Many manufacturers have systems with varying degrees of System/3 compatibility. Most, however, offer only RPG-II for

(Continued on Page S/24)

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Just a Marketing Ploy?

Small Business CPUs Overlap Larger Main Systems

The following article is an excerpt from Auerbach Minicomputer Reports, an updated reference service published by Auerbach Publishers, Inc.

Over the past few years, major computer manufacturers have introduced disk-processing small business computers which are only slightly less expensive than their smallest general-purpose computers. In some cases, these small business computers duplicate the functional capabilities of the small general-purpose computers from their respective companies.

For example, in memory size the IBM 3/15 overlaps the capabilities of the 370/115, the Burroughs B1700 overlaps the B2700 and the Honeywell 58 overlaps the 2020 (See Table I).

Consider a less obvious yardstick for capability: timings. The 370/115 and Honeywell 2020 are considered faster and more powerful than the IBM 3/15 and the Honeywell Model 58, respectively. Burroughs B1726 and B1728 small business computers with their 125 nsec CPU cycle, however, are as fast as the B4700 processors and faster than any B2700 or B3700 system.

Why do these mainframe makers offer computer systems with similar ranges of capabilities under different names? The answer is simple: the small business computer and the small-scale general-purpose computer are destined for different markets and are priced differently.

The three manufacturers mentioned above designed these general-purpose computers for their existing customers. These systems offer in each case substantial improvement over the equipment they were designed to replace: IBM 360/20, Burroughs B2500/3500 and Honeywell Series 200 Model 115.

On the other hand, the small business computers are designed to compete against similar offerings from other mainframe manufacturers, as well as the long and growing list of small disk-processing business computers offered by independent manufacturers. They are sold for the most part to first-time computer users and unit record equipment users. And they must be offered at competitive prices.

Price differences are indeed substantial. A Burroughs B1726 or B1728 processor, with 96K bytes of main memory, costs only 50% of a B2771 with a 100K-byte memory and no more than 35% of a 100K-byte B3771. IBM's 3/15 costs from 55% to 60% of the price of a 370/115 with equivalent main memory sizes.

Technological advancements have made it less expensive to manufacture computer systems. But to allow existing users to replace their equipment with less expensive (albeit more power or at least equally powerful) equipment would not make business sense.

Consequently, manufacturers use one product line to maintain an orderly growth of their existing customer base, and they use another product line to draw new customers and to counter any erosion of their customer base. To them, this is just an economic fact of life.

User's View

The user's primary concern, however, is to get the most performance for his dollar. So what does a general-purpose computer offer to warrant its higher price over the small business computer with apparently similar capabilities?

General-purpose computers offer wider choices of input/output peripherals and greater expandability for their disk-held data bases than their "comparable" small business systems. The gap is closing, however.

When they were first announced, most small business computer systems were restricted to one or two IBM 2311- or 5444-type disk drives. The disks yielded a combined on-line capacity of less than 30M characters. But IBM 2314-type multiplatter disk pack drives are becoming available on one competing small business computer after another. As a result, mass mainframe manufacturers have already followed suit and made disk pack drives available on their smaller systems.

Data communications facilities were once a prerogative of general-purpose computer systems, but this is no longer true. Small business computers now offer a variety of data communications capabilities. They are available as intelligent remote job entry terminals to larger general-purpose systems.

They can serve as hosts to a number of local and/or remote alphanumeric display terminals for on-line file inquiry and updating. And they can be connected by way of one or more synchronous data communications lines.

Better Software Too

If small business computers are catching up with small general-purpose computers in terms of hardware capabilities, they are also fighting the battle on the software front. Of the three small general-purpose computers mentioned above, only one can claim a more powerful operating system than its corresponding small business system.

IBM 370/115 users are offered DOS/VS with virtual memory facilities. These facilities are contrasted with the simple foreground/background dual programming, real memory facilities on the IBM 3/15.

Operating systems offered by Burroughs and Honeywell, for their general-purpose and small business systems are not that clearly set apart in power and throughput. Burroughs offers virtual memory facilities and multiprogramming on both the MCP-II for the B1700 series and the MCP-V for the B2700/3700/4700 series. Although MCP-V has a three-level priority job scheduling system, MCP-II – based on Burroughs' large-scale systems software – actually uses main memory better than does the MCP-V.

The Honeywell-Bull Model 58 is limited to simple foreground/background dual programming just like the IBM 3/15. But Mod I MSR on Honeywell Model 2020 is little better. Users graduate to the multiprogramming OS/2000 for the Model 2030.

The real question is whether the small general-purpose computers offer any operating system improvements that users really need. IBM DOS/VS and MCP-V offer sophisticated priority job schedulers that are wonderful for users planning to run a scientific/mathematical terminal-oriented open shop, or even for financial analysts and stock brokers with frequent ad hoc discounted cash flow or stock yield analysis. But do "older" systems with routine accounting and production scheduling runs really need this capability?

The 3/15's two-partition, real memory multiprogramming facilities are primitive compared to DOS/VS, but they are equal to those of the pre-VS DOS used on the System 360 Models 22, 25 and 30, as well as small 40 configurations. Until recently, these were the upgrade systems for users of the 360/20. The Burroughs MCP-II is at least as good as the B2500/3500 MCP-V.

Memory Range (bytes)	Small Business	General Purpose
64K – 128K	IBM 3/15	IBM 370/115
30K – 60K	Burroughs B1712 and B1714	Burroughs B2731, B2741 and B2751
60K – 128K	Burroughs B1726	Burroughs B2761
60K – 256K	Burroughs B1728	Burroughs B2771 and B3771
24K – 64K	Honeywell 58	Honeywell 2020

Table 1. Memory Size Comparison

Before you rush to call in your order for a small business computer, however, please read on. Those marketing strategists who laid down the parallel product lines approach are not simple-minded. The fact that any "older" systems user who attempts to "downgrade" to a small business computer faces considerable software conversion costs, which may offset any savings in hardware rentals. Not only must programs be recompiled, they may have to be rewritten, probably in a different language.

The small business computers offered by IBM, Burroughs and Honeywell-Bull are machine-code incompatible with each other and with earlier computer families from the same manufacturers. They also offer no assembly-level or macro assembler language compatibility with the earlier systems. For example, the Burroughs B1700 series does not offer a BPL (Burroughs Programming Language) compiler.

Small general-purpose computers do offer a number of advantages over small business computers with similar capabilities. It is still frightening, however, for small commercial users to be locked into a narrow upgrading path by their program investment.

Those present users who wish to escape from the trap and those new users who wish to avoid falling into a locked-in situation must follow a few basic rules. Remember, the primary objective is to retain maximum portability between systems.

Rules to Follow

The first rule is to avoid any future programming in a machine-oriented assembler or macro assembler language.

Use only high-level machine independent language compilers even if the compiled object programs are more demanding of main memory space. Main memory cost is going down all the time. Any extra hardware costs incurred now will be offset by future savings resulting from preserving freedom of choice.

If a choice of high-level language compilers is available, choose the most widely used language rather than a proprietary one developed by a manufacturer. Fortran is the most widely used language for scientific programming and Cobol is the most popular language for business programs. RPG II is becoming a de facto industry standard for small business computers.

PL/I, despite its attractiveness as a dual-purpose scientific/commercial language incorporating job control commands, should be avoided for the time being. It will tend to lock you into the IBM 370 and its successors because few non-IBM manufacturers have yet implemented PL/I compilers.

Even when using Fortran and Cobol, restrict programmers to standard Ansi-defined facilities. Manufacturer-defined extensions should be made out of bounds.

Standard application packages can save on software development costs. Choose a software package suitable for present requirements at reasonable cost.

Other things being equal, select a package developed by an independent over one offered by a hardware manufacturer. Software houses and users will not care which system you use to run the package. Hardware manufacturers tend to restrict their packages to their own hardware, sometimes to only some of their own systems.

When choosing between packages offered by rival software houses, prefer the one with source code written in an industry standard, high-level language, such as Cobol or Fortran.

'She Wanted Something to Do So We Gave Her a Mini'

System /3...Other Options

(Continued from Page S/23)

which they claim compatibility. To be truly compatible, however, one must have [RPG] language, operating system and peripheral device compatibility.

Further such compatibility must be total, since being 99% compatible is somewhat like being 1% pregnant.

One of the first minicomputer forces in the compatible area was DEC with the RPG-II compiler operational on the PDP-11-based DEC Datasystem 500 RPG model, inspecting the DEC system, however, reveals only about 97% compatibility with an operating system suitable for only a single user and the absence of a multifunction card reader.

Last year's NCC presented users with a Lockheed system called System III, and, although you may ask, "What's in a name?", the intent is obvious.

Other firms, of course, have "compatible" systems operational, and industry rumors indicate that certain other manufacturers will be announcing "compatible" systems within the very near future.

Jon David is president of Systems RDI and a small systems consultant.

Societies/User Groups

Basic Systems Workshop Added to ASM Conference

DALLAS – The Association for Systems Management 1974 Conference has added a "Basic Systems Workshop" and a "Management Development Program" to its total offering of 27 seminars.

The April 21-24 meeting at the Convention Center here is intended to have broad appeal to all segments of the systems and data processing fields. The seminars will cover software, computer technology, systems management, general management, project planning and human relations.

The "Management Development Program," a new concept for ASM conference attendees, consists of a planned course of three required and two elective subjects.

MDP participants may choose from four required subjects and four electives.

Registration for the "Basic Systems Workshop" will be limited to 125 persons on a first-come basis. It will cover systems concepts and functions, the roles of management and systems, charting, mechanics and logics of systems analysis. The workshop, consisting of 12 sessions, will emphasize the human considerations required to involve users. Presentation methods will include lectures, workshops, case studies, group discussions and conferences.

Instructors for the workshop include Dr. Loren E. Waltz, Indiana University at South Bend; Neal Thomsen, senior education analyst, CNA Insurance, Chicago; Larry S. Burr, manager of office systems and procedures, Honeywell, Phoenix; and Richard B. Brandt, manager of medicaid services, The Computer Co., Richmond, Va.

Registration fees will be $150 for ASM members and $200 for non-members, and will include all seminars, three luncheons, reception, two dinners and entertainment and a hardbound copy of the conference "proceedings."

Society Sundries

The leaders of the securities processing industry have been invited to exchange information on developments in the handling of stocks and bonds with a new committee of the American Bankers Association (ABA). ABA President Rex J. Morthland announced the formation of the Securities Processing Committee, chaired by George C. Strohl, vice-president, Bank of America.

The committee will review and evaluate proposed securities processing procedures and regulations and recommend positions and courses of action for the banking industry in relation to them.

– – –

The Association of Data Processing Service Organizations, Inc. (Adapso) will move its headquarter's office to 210 Summit Ave., Montvale, N.J. 07645, effective April 2.

– – –

Fred C. Messemer has been named to the newly created position of executive vice-president of International Business Forms Industries/PIA. Messemer has served as executive director of the business forms association since March 1970.

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SAN DIEGO – Instant replay of in-flight dogfight training missions can be seen by student jet pilots through a computerized U.S. Navy system now operational.

The Air Combat Maneuvering Range (ACMR) lets student pilots duel each other in air-to-air combat at supersonic speeds and altitudes up to more than 50,000 feet. While the mission is taking place, the teacher watches every move of up to 16 participants simultaneously, monitoring them from a ground station with CRTs.

Used by Marinea

ACMR, now in use by the marines in Arizona and the Navy in California, was developed by Cubic Corp. and is being produced under an $8.5 million Navy contract.

With no cameras, the system uses an automatic microwave tracking network and three Xerox Sigma 5 computers.

This CRT shows images of aircraft in actual dogfight training as they are drawn by three computers.

Through a ground-to-air voice communications link the teacher can advise pilots of any potential danger and also coach in dogfight maneuvers, advising of hits and misses on opponents.

ACMR works like a giant training ground, according to the firm. As planes fly over the 40-square-mile range electronic signals are beamed to six ground-based tracking stations 10 times a second. The electronic impulse tells the computer the exact location of each aircraft in relation to the range. In turn, the computers draw images on the monitoring screens and display flight parameters on the other tubes.

Once Again Lightly

The computers also record the mission and provide printout results for a permanent record. At the touch of a button on the control panel, the mission can be shown over again.

With ACMR, there is no live ammunition fired, no targets used and no simulators.

The cost of the system is expected to be recovered in two years with ammunition and aircraft fuel savings alone. According to the company, ACMR is much safer for the trainees and should cut down on the number of training accidents.

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Data Bank May Aid Growing Nations

ORMOND BEACH, Fla. – The transfer of technological data from developed countries to underdeveloped ones is now being facilitated via normal communication lines, CRT and teletypewriter terminals and a lone IBM 360/30.

A company known only as Dr. Dvorkovitz & Associates has assembled a data bank of subjects ranging from medicine to petrochemicals, and from aerospace development to plastics. So far, over 10,000 complete packages, each dealing with one specific question of technology, are on file, Vladimir Dvorkovitz said.

Research Work

The information is provided by employees who contact research centers and companies, asking them to fill in summary forms. The company currently has offices in Munich, Vienna, Milan, Rome, Jerusalem, London, Paris, Tokyo, Melbourne and Madrid, as well as three U.S. cities.

A user equipped with a telephone or teletypewriter can make a call and type in a request on the terminal typewriter. This message passes over the normal communication lines, accesses the data bank in Ormond Beach, and within minutes the information is displayed on a CRT at the point of origin, Dvorkovitz said.

Summary

If the query is for a process to make acrylonitrile available for Nigeria or a new type of disk brake or a better way to remove sulfur dioxide from the atmosphere for a factory in Ohio, the message will appear as a summary of the technical details, including whom to contact for further information. This summary, Dvorkovitz said, fills two CRT screens.

The system, Dvorkovitz said, has been demonstrated in many U.S. cities as well as in Japan. As a result, he added, the governments of Israel and Hungary have subscribed to the service, and Shell, Dupont and Warner-Lambert plan to install terminals to hook into the system.

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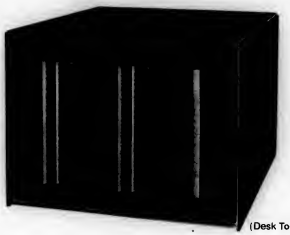
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Gift Mini Checks Mass. Pollution

BOSTON – A minicomputer is being put to work monitoring data on air pollution collected by almost 60 stations in Massachusetts.

The mini, the 30,000th mini to come off the Digital Equipment Corp. assembly line, was a gift to the Massachusetts Department of Public Health.

The mini will take over work being performed by a service bureau for the air quality control unit of the Division of Environmental Health. With their own computer, officials estimate they will reduce by two thirds the annual DP expenditure of more than $40,000.

In addition, the DEC PDP-11/35 will produce reports tailored to the needs of the bureau's various sections. Previously, staff members culled the reports manually for pertinent statistical data.

Grant to Aid Center For DP-Brain Studies

AMHERST, Mass. – The University of Massachusetts has received a $300,000 grant for the development of a center for computer science studies related to brain function.

The Center for Systems Neuroscience will concentrate on three major areas: computer modeling and simulation of brain functions; computer handling of data for brain experiments; and neurocybernetics or comparative studies of the computer and the brain.

The grant, from the Sloan Foundation, will be combined with some support from the university. Hampshire, Mount Holyoke, Smith and Amherst colleges will also have access to the center.

Developers Turn to DP

LA JOLLA, Calif. – Real estate developers and area planners will turn increasingly to the use of computerized models to simulate the effect of heavier traffic flow and its impact on air quality, according to Dr. Walter England, manager of environmental sciences for Systems, Science and Software.

Federal and state standards require data before construction permission is granted, he said.

Shopping centers, sports complexes, airports, drive-ins, residential developments of more than 500 units, amusement parks and highways with usage greater than 10,000 vehicles per day fall under federal and state standards, England said.

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COMPUTER INDUSTRY

CI Notes

Interdata to Change Hands?

OCEANPORT, N.J. – Interdata, Inc. and Perkin-Elmer Corp. have agreed in principle to the acquisition of Interdata by Perkin-Elmer.

Under terms of the agreement, Perkin-Elmer will issue .8 of a share of common for each share of Interdata common outstanding.

The acquisition is subject to approval by the boards of directors of both firms and shareholders of Interdata.

Spokesmen for both firms said they see Interdata operating as a subsidiary.

Perkin-Elmer does not intend to interfere with Interdata's market direction, a spokesman said.

Interdata earned $1.2 million for the year ended Dec. 31 and Perkin-Elmer earned $14.3 million for the year ended July 31.

30,000 Expected at Intercon

NEW YORK – Attendance at IEEE Intercon is expected to reach 30,000 at the show here this week at the Coliseum and at sessions at the Statler Hilton, conference organizers said.

British and Soviet firms will join the 400 exhibits on display at the Coliseum March 26-29. At the Hilton, 40 sessions on topics ranging from international markets to semiconductors will be held. Wednesday night banquet speaker Emilio Q. Daddario, director of the Office of Technology Assessment (OTA), will discuss the role of the OTA as an "early warning system" for Congress on the probable impacts of new technological breakthroughs.

Centronics Provides Singer Printers

HUDSON, N.H. – Centronics Data Computer Corp. has signed a contract valued at $3.5 million to provide the Business Machines Division of Singer Co. with impact printers designed to Singer specifications.

The printers will be marketed as part of Singer's 1500 Intelligent Terminal systems, the System Ten and point-of-sale systems.

Supershorts

A special interest group for semiconductor companies has been formed within the Western Electronics Manufacturers Association.

– – –

Innovation Data Processing, Inc. has named Software Products Co., Ltd. of Tokyo as its Japanese representative.

– – –

Electronic Arrays, Inc. has retained California International Trade Corp. to establish and implement a marketing program to penetrate the USSR market for integrated circuits for electronic calculators.

Reply Brief in Appeals Court

Telex Rebuts IBM Competition Claim

By E. Drake Lundell Jr.
Of the CW Staff

DENVER – If IBM's definition of fair competition is allowed to stand, "nothing would prevent IBM from excluding each of its competitors, systematically," from the computer industry, Telex argued in its reply brief to the U.S. Court of Appeals here.

In addition, Telex said the Appeals Court should reinstate the $31 million in damages against IBM that was taken off the original judgment against the firm by Judge A. Sherman Christensen in Federal District Court.

IBM had already filed its brief in the appeal case, charging the judgment against it condemned fair competition in the computer marketplace.

However, Telex in its reply argued that "IBM's arguments are antithetical to the purposes and policies of the antitrust laws."

IBM argued that the court had not found IBM had cut any prices below its cost of manufacturing, and that therefore its conduct could not be considered "predatory" in the traditional sense.

However, Telex said, "given the initial advantage of the monopolist's lower manufacturing cost IBM was able to implement its strategy of systematically destroying and/or excluding PCM (Plug Compatible Manufacturers) competitors without appearing to cut its prices below cost."

A monopolist, the Telex brief continued, "can always lower its prices and thereby provide, however temporarily, the end user with a lower price on the products affected. When a monopolist does this to drive out its competition, however, its conduct, in the context of the antitrust laws, should be measured in terms of its real motivation and not the incidental effect.

"When the real motivation in selectively lowering prices is to drive out competition," Telex claimed, "the short-term effect is always a lower price on that product.

"Thus, to properly measure such competitive pricing against the antitrust laws the courts must look not at the short-term benefit to the consumer but at the long-term likelihood that once the monopolist has eliminated its competition, it is thereafter free from market constraints to do what it wishes with its prices, and accordingly, based upon past conduct, may raise them to an artificially high level."

"It must be concluded that if IBM could drastically reduce its prices and still price at a 'reasonable profit' then it was pricing at an unreasonable profit while its monopoly power was unchallenged," Telex said.

Biddle Seeks Underwriters Lab To Implement Security Systems

WASHINGTON, D.C. – A federally chartered nonprofit "Super Underwriters Laboratory" should be established to design and certify DP security systems, Jack Biddle, executive director of the Computer Industry Association said in a recent address at the National Bureau of Standards.

The group would be set up somewhat like the Financial Accounting Standards Board, funded by government, producers and users of DP equipment, run by a seven-man board of directors who would work solely for the laboratory.

A principle element in Biddle's suggestion is that the user would have control of the security system, not his suppliers, Biddie said.

Standard 'Locks'

"The design of the 'locks' would be standardized and available to all – hardware and software manufacturers and users alike. However, the 'keys' or techniques needed to make a specific system secure would be assembled by the user following approved procedures," he noted.

"This might involve the selection and installation of a unique combination of read-only chips in the mainframe and each terminal: it might involve the creation of algorithms or any number of other techniques."

Through certification tests the laboratory would, "to a certain extent, be able to mandate compliance – just as Underwriters Laboratory does today," Biddle said.

Two alternative means of establishing security measures are not viable, he said, as one depends on volunteer efforts and the other would be conducted by one manufacturer, IBM.

Biddle said he believed the IBM approach would be "detrimental to the user, the public and the industry as a whole."

For although IBM has the resources to do the job, it has indicated that only the results of the first two years' worth of effort of a five-year R&D project will be placed in the public domain.

"We need to develop technical solutions that are equally applicable to all hardware and software – both present and future systems regardless of who makes them. It would be all too easy to develop security systems involving firmware, encryption and other techniques that would effectively lock out intruders and interlopers – and competitors," Biddle said.

Another alternative would be a voluntary industry/government cooperative program centering around the National Bureau of Standards.

"Unfortunately, a voluntary, cooperative effort often fails unless the economic motivation of the participants is strong," Biddle said.

Mainframers Mull Subpoena

IBM-U.S. Order Draws Protests

NEW YORK – With the exception of Digital Equipment Corp. most of the mainframe makers subpoenaed by IBM and the government for their upcoming lawsuit plan to protest the subpoena only in limited areas, lawyers for both sides told Judge David N. Edelstein recently.

But DEC has "posed a wide-ranging" challenge to the subpoena, the lawyers said, which could delay the proceedings in the case.

Most of the other mainframers, the parties said, planned to challenge only limited areas of the subpoena and to seek a strong protective order restricting the use of the information to be gained from the subpoenas – apparently showing some concern that IBM might use the proprietary information for business purposes and not just for the law case.

As outlined by lead government attorney Raymond Carlson, the various firms subpoenaed have expressed the following concerns:

- Burroughs – plans to move only in the area of a protective order.
- Control Data Corp. – plans no action on the subpoena at all.
- General Electric – intends to make some objections to certain parts of the government and the IBM portion of the subpoena.
- Honeywell – will move for a strong protective order and objects to some parts of both sides of the subpoena.
- NCR – no objections to the subpoena, but will move for a stronger protective order.
- RCA – continues to object to some parts of the subpoena and will seek stronger protective order provisions.
- Singer – will make no motions of any kind.
- Sperry Rand – will object to some of the subpoena questions submitted by IBM but not to those of the government and will seek stronger protective order.
- Xerox – objects to some parts of the IBM section of the subpoena and will seek a stronger protective order.

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In Large Installations

Univac Sees Key-Disk as Better Answer

By Molly Upton
Of the CW Staff

BLUE BELL, Pa. – Key-to-disk is a complement to the keypunch market, Dennis Lucas, director of the basic systems program at Univac, said in explaining the firm's entry into the key-to-disk field with its 1900 Computer-Assisted Data Entry System [CW, March 6].

"The keypunch is here to stay and is going to be around a long time, but in large installations, we'd have our heads in the sand if we didn't realize that key-to-disk is a better answer," he noted.

Versatility Sought

"We want to service data entry needs of every size prospect," he added. "I think with the 1700, 1800 and 1900 we're getting awfully close to that," Lucas added.

Data entry is moving to more of a keystation-oriented price peformance area where a key-to-disk system outperforms keypunches in large installations.

"We want to be a very strong factor in the marketplace in data entry. That represents 30 cents out of everybody's operating dollar and IBM has elected not to go into the key-to-disk area, so we looked at that as a product opportunity," Lucas said.

Univac studied the key-to-disk market, and studied the competition. "We feel we've come in with a Cadillac-type product at a Ford price, so we can kind of stretch down. Although we won't win all the low-range units, we'll certainly be competitive with the mid-range sites, where the market is," he added.

Lucas sees the 1900's competition from Computer Machinery, Mohawk and Entrex.

Univac went OEM for its processor, buying units from Pertec along with manufacturing rights. The reason for this, Lucas explained, is that the "marketing window is very time-dependent. When people elect to go key-to-disk, they're essentially lost as a key-to-disk prospect forever."

Once a system is in there and doing the job it's in, he said. "We felt we had to get to the market now, and Pertec had a good system available."

Univac has already installed over half a dozen systems, Lucas said.

"We are blessed by the fact we have a dedicated data entry force, dedicated only to selling keypunches. They understand the data entry problem, and picked this product right up. They were selling the day after announcement," Lucas said.

Keypunches have traditionally been a leased base, but "we're seeing an Interesting thing. People looking at the 1800 are looking to purchase it," he added.

"They're saying this is the last keypunch and we may as well buy one now because we're always going to be in cards," he explained.

The 1800 is a "super keypunch," Lucas remarked. With the microprocessor it can do things a hardwired key-to-disk unit can't, he said.

Orders & Installations

The Consolidated City of Jacksonville/Duval County has ordered a Burroughs B6700 to provide financial and budget services for all city departments.

– – –

Paccar, Inc. has purchased AR-70, Computer Systems & Education Corp.'s automated accounts receivable credit management system. The system will be installed on a 370/145 under DOS.

– – –

The Michigan Department of State Highway & Transportation has ordered a Series 2000 drafting system from Xynetics, Inc.

– – –

United Air Lines has ordered 64 intelligent display terminals, 50 P-100 printers and auxiliary equipment from Incoterm Corp., for use in the company's Food Service Management and Information System.

TELEX V, IBM APPEAL ANALYSIS

Full Text of:

- Judgement, Findings of Fact and Conclusions of Law in District Court
- Amended Judgement, Findings of Fact and Conclusions of Law in District Court
- IBM Brief on Appeal
- Telex Brief on Appeal
- IBM Reply Brief on Appeal

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Threat from Micros Disavowed

MONTEREY, Calif. – Microcomputers don't offer "any more threat to the minicomputer business than the large minicomputer manufacturers such as DEC, General Automation and Data General offer to IBM today," observed Dr. William Davidow, microcomputer group manager of Intel Corp.

One significant difference between micros and minis is that micros are built into systems rather than being free-standing boxes on which other system components are added, he noted.

In a few years microcomputers, minis and DP equipment will be sold by respective companies "with the same computing power, but sold by the microcomputing manufacturer for $200, by the minicomputer manufacturer for $2,000 and by IBM for $20,000," Davidow predicted.

The reason for the price discrepancy is basically the applications packages and services that the customer receives with each product, he explained.

Microcomputers are comprised of large-scale integrated circuits that have the computation power of from 5% to 50% of a typical minicomputer, Davidow said.

They are being used increasingly in point-of-sale terminals, remote and intelligent terminals, traffic sensors and scientific and instrumentation applications.

They reduce the cost of system electronics and cut time and development costs. "We are seeing typically in many applications an 80% reduction in the cost of electronic logic as a result of these devices," Davidow said.

Use of microcomputers can expand the application base of electronics by putting simple programming techniques at the disposal of engineers, enabling them to put "sophisticated electronics inside their sophisticated instrumentation technology."

"About 80% of the dollar volume generated in a microcomputer sale is a result of selling add-on memories that go with the basic processor or devices." Software costs are not exclusive to the larger machines.

Many microcomputer customers spend more money developing programs to put in the memories than they will on the total amount of memory, he added.

"Good software support for microcomputer customers can reduce that software development time by a factor of 10, therefore having a dramatic effect on customers' costs," he noted.

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GSA Awards Itel Mandatory Contract

SAN FRANCISCO – Itel Corp.'s Data Products Group has received a mandatory contract from the General Services Administration for 3330-type disk drives for IBM 360s and 370s.

The award, valued by Itel at $25 million over the potential five-and-a-half year life of the contract, is on behalf of all federal departments and agencies.

All government demands for 3330-type devices must be initiated through Itel's Data Products Group where the contract meets government requirements.

Under the agreement, GSA has guaranteed it will acquire at least 100 Itel 7330 drives and 12 7830 controllers. The contract runs through June 1974 and may be renewed for five consecutive years, Itel said.

The equipment will be used to satisfy requirements for new equipment as well as replacement, where economically feasible, of installed rental equipment of other vendors.

Other Contracts

Mini-Computer Systems, Inc. has received a contract from Westinghouse Learning Corp. for its Aids II system which will be incorporated into Westinghouse Learning's product line.

Litton Industries' Sweda International Division has been awarded a contract by Au Printemps S.A., France, for a minimum of 750 Sweda Series 725 point-of-sale terminals and related processing equipment.

NCR has received a contract from National Data Corp. for 5,000 on-line credit transaction terminals.

Contracts

Burroughs Fined in Conspiracy Suit

SAN FRANCISCO – Burroughs Corp. has been ordered by a federal jury to pay $3.8 million in trebled damages to Leonard J. Palmer, former owner of now-defunct Palmer Data Corp. here.

The jury found that Burroughs had conspired with Cubit Corp., an also now-defunct DP center, to restrain and eliminate competition, which resulted in Palmer Data going bankrupt.

Palmer claimed the sale by Burroughs of a small batch processing business to Cubit for $250,000, including equipment, was in violation of the Sherman Act, a Burroughs spokesman said.

Burroughs doesn't consider the jury award "a final determination of the litigation" and its "trial counsel is of the opinion that the verdict isn't supported by the evidence," the spokesman said.

Burroughs "will pursue all legal remedies to vindicate its position in the courts," he added.

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Program Bank Proposed for EEC Nations

LONDON – An EEC-wide "hybrid program bank" offering short-term protection for properly documented software programs has been proposed for the Europaan Economic Community.

Nigel Spinks, a specialist in European law, proposed such a bank as an answer to the problems of licensing and protecting software in EEC nations.

The protection would extend only to those programs deposited for general availability at agreed royalty or license rates, according to Spinks' plan.

As an incentive to cooperate, programs not registered in the bank would be protected only by the confidentiality laws of their nation, Spinks said.

The program bank would accept programs in the form of flowcharts, documentation and the programs themselves in a variety of media.

Once verified as unique and workable, the program would be made gencrally available, at stated license or royalty fees with invcntor's rights lasting five or six years, rathar than the many years patents now involve, according to an article in *Computing*, a British Computing Society publication.

Japan Cobol Converter Allows Program Exchange Among 9 CPUs

By Shukan Computer

Special to Computarworld

TOKYO – The Japan Information Processing Development Center (Jipdec) has developed a machine-independent Cobol source code converter which enables program exchange between nine CPUs from six manufacturers.

Tha program, called Jyoinos, was developed to improve joint utilization of programs and data files.

Jyoinos can surpass the limitations of various hardware and software and can, accurately and rapidly, convert Cobol program and magnetic tape data files for other systems, officials said.

Jyoinos has been in use at Jipdec since 1972 and has raised computer utilization efficiency greatly, they said.

The system operates on the IBM 360, Univac 9200 II, 9300, 9300 II, as well as two Neac units, two Facom units, two Tosbac and one Hitachi.

Jyoinos takes a program developed in Cobol in any one of the above systems, and without the aid of an intermediate language converts the program into Cobol suitable for any one of the other systems.

The Cobol grammar of the original system and that of the system for which it is intended (destination system) are compared; then the original program which was antered is separated into the following parts:

- Statements not needing conversion.
- Statements with possibility of conversion.
- Statements without possibility of conversion.

Output in the first classification remains unchanged. Statements in the second category are converted according to the grammar of the system for which it is intended. The third type of statement generates comments regarding the incapability of conversion in the source column and in the comment column; statement output occurs as is.

This system has been developed with the Facom 230-60, but because Cobol is its development language, the system itself can be converted allowing the othar eight systems to utilize it.

The system takes the magnetic tape data file drawn up by any one of the foregoing systeme and converts it for use by any one of the other systems.

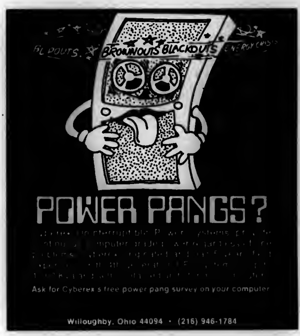
Datasaab Line Adds Facit Units

LINKOPING, Swaden – Saab-Scania's Datasaab Division has broadaned its line through the addition of Facit/Electrolux small stand-alone computers.

The Facit M10, M15 and Facit 6501 will continue to be manufactured at the Facit Malmo plant, but will be consolidated into the Datasaab line. The Facit marketing function will be integrated into the Datasaab organization.

The marger does not affect Facit's OEM or other activities.

Datasaab has been concentrating on midi machines and smaller units with distributed intelligence, such as its financial tarminals, while Facit's product line includes the M10 for data collection, the M15 invoicing system and the Facit 6501 office computer system.



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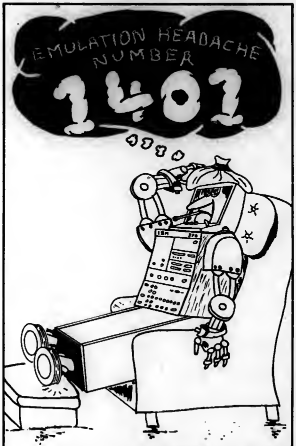

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New Product Costs Cited

REI Posts Quarter Loss, Lower Revenues

DALLAS – Despite a loss of nearly $1.3 million in the first quarter, Recognition Equipment, Inc. (REI) President Jay Rodney Reese indicated the company will pursue long-term benefits resulting from "major expenditures in product redirection."

Revenues declined to $6.8 million from $7.5 million.

The loss of $1.3 million or 25 cents a share compares with earnings of $480,000 or 10 cents a share in the first quarter ended Jan. 31, 1973.

In the year-ago quarter, the firm gained $1.1 million from the sale of securities of Docutel Corp.; in the 1974 quarter the gain was $113,000 with a loss of about $180,000 on translation of foreign currencies.

In addition, REI provided for taxes of $333,000 on certain overseas subsidiaries' profits that Reese explained could not be offset by the parent company's losses.

Company-funded engineering expense was approximately $805,000 greater in the 1974 period than in the first quarter of 1973.

Most of the increase, Reese said, was attributable to new product development, but about $110,000 was a further provision for engineering field support of the company's first Trace bank check-processing system, which has encountered delay in the completion of acceptance testing.

"We can take one of two roads to become profitable. We could concentrate on those items that are our strengths and in which we see short-term opportunities. We could eliminate all other expenditures and probably become profitable, but only in the short term," Reese said.

"I have chosen the second and more arduous road, which requires major expenditures in product redirection. Programs like the hand-held OCR Wand, for example, though company-funded in 1974, will not result in a product line for the company until at least 1975.

"As a further example, we are committing initial expenditures on a modular standardized financial transaction system intended to meet the requirements of a significant number of banking institutions."

The backlog of signed contracts on Jan. 31 stood at $26.3 million, up from $19.2 million a year earlier.

Shipments in the first quarter of 1974 totaled $5 million, compared with $2.6 million reported for the 1973 period; both figures represent purchase value.

"It will be at least 1975 before we anticipate making volume deliveries of wands and are able to include those revenues in our results," he said.

"It will be a tough road for a while, but we have the potential, and already I look forward to presenting our story to the stockholders in 1975," Reese added.

Sycor Reports Increased Earnings, Revenues in Fourth Quarter, Year

ANN ARBOR, Mich. – Sycor, Inc. continued to achieve increased levels of revenues and earnings for the fourth quarter and year ended Dec. 31.

Revenues for the year were $31.7 million compared with the $15.7 million reported in 1972.

Earnings in 1973 reached $2.5 million or 94 cents a share compared with $1.2 million or 47 cents a share last year. The 1973 figures include a $2 million charge to reflect the cumulative effect of an accounting change made in the third quarter, and a $1.6 million tax credit.

Revenues for the year doubled to $31.7 million from $15.7 million.

Fourth quarter earnings, after giving effect to the applicable tax-loss carryforward, were $1.2 million or 43 cents a share compared with $716,600 or 30 cents a share in the 1972 quarter.

"Last year was a period of important progress for Sycor in terms of new product development, accelerated marketing efforts and increased financial stamina. "During 1974, we anticipate these strengths will provide the framework for continued growth," President Samuel N. Irwin said.

However, "in view of the many uncertainties in today's international economic climate, we must temper our outlook for 1974 with a degree of caution, recognizing that broad forces of economic change may moderate the rate of Sycor's growth," he warned.

AJ Scores Record 9-Month Highs

SUNNYVALE, Calif. – Anderson Jacobson, Inc.'s earnings and revenues reached record highs for the nine months ended Dec. 31.

In the nine months, the company earned $323,431 or 13 cents a share compared with $262,284 or 10 cents a share a year ago.

Revenues amounted to $4.9 million, a 54% increase from $2.9 million in the same period a year ago.

In the third quarter earnings reached $123,374 or 5 cents a share, compared with $99,590 or 4 cents a share last year.

Revenues for the period were $1.8 million compared with $1.1 million.

President Raymond E. Jacobson said gains were achieved despite high interest expenses and rising prices for parts.

Service staff was increased substantially and order input remains strong, he added.

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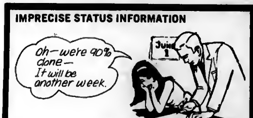

Oh—we're 90% done— It will be another week.
June 1

UNRECOGNIZED TROUBLE AREAS

We've lost 3weeks on inventory— I didn't know John would be delayed on payroll.

DELAYED CORRECTIVE ACTION

Why wasn't this fixed before Production started?

Earnings Reports

NATIONAL CASH REGISTER
Year Ended Dec. 31

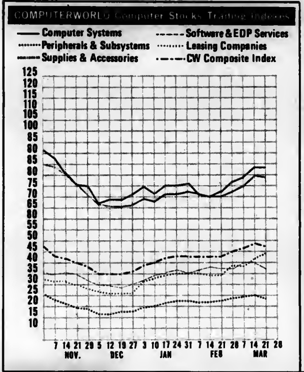
	1973 (000)	1972 (000)
aShr Ernd	$.300	.....
Revenue	1,816,281	$1,557,699
bSpec Chg	.....	70,067
Earnings	71,961	(59,612)
a3 Mo Shr	1.40	.....
Revenue	577,428	456,719
bSpec Chg	.....	70,067
Earnings	34,675	(63,208)

a-On a fully diluted basis. b-Primarily related to company's transition from mechanical products to electronic products.

SYSTEMS ENGINEERING LABORATORIES
Three Months Ended Dec. 28

	1973	1972
Shr Ernd	.....	$.07
Revenue	$2,817,000	4,115,000
aSpec Chg	2,403,000	.....
Earnings	(3,997,000)	177,000
6 Mo Shr	.....	.20
Revenue	5,917,000	7,563,000
aSpec Chg	2,403,000	.....
Earnings	(4,775,000)	539,000

a-Write-offs of good will and inventory related to discontinuance of small computer product line and write-offs for obsolete inventory.



INTERDATA
Year Ended Dec. 31

	1873	1972
Shr Ernd	$.65	$.45
Revenue	18,858,200	12,814,800
Tax Cred	88,000	349,700
Earnings	1,333,100	894,900
3 Mo Shr	.20	.09
Revenue	5,924,700	3,544,800
Tax Cred	37,800	.....
Earnings	398,100	200,200

PERTEC
Three Months Ended Dec. 28

	1973	1972
Shr Ernd	$.07	$.06
Revenue	7,345,000	5,976,000
Spec Item	a56,000	b(80,000)
Earnings	203,000	193,000
6 Mo Shr	.22	.21
Revenue	15,204,000	11,921,000
Spec Item	a262,000	b(80,000)
Earnings	661,000	647,000

a-Tax credit. b-Debit; cost of proxy contest.

RAPIDATA
Year Ended Dec. 31

	1973	1972
Shr Ernd	$.40	$.58
Revenue	9,535,000	7,684,000
Earnings	741,000	1,066,000
3 Mo Shr	.04	.17
Revenue	2,569,000	2,031,000
Earnings	72,000	323,000

AMERICAN MICROSYSTEMS
Year Ended Dec. 28

	1973	1972
Shr Ernd	$2.16	. ...
Revenue	58,099,000	$28,666,000
Disc Op	(218,000)	(683,000)
Spec Chg	.....	a336,000
Earnings	4,796,000	(932,000)

a-From accounting change.

PITNEY BOWES
Year Ended Dec. 31

	1973	1972
Shr Ernd	.....	$1.02
Revenue	384,900,000	339,600,000
Disc Op	a(42,352,000)	1,515,000
Earnings	(22,416,000)	13,640,000
3 Mo Shr	.53	.34
Revenue	110,900,000	97,000,000
Disc Op	.....	(1,492,000)
Earnings	6,941,000	4,514,000

a-Write-off of the company's entire investment in Pitney Bowes-Alpex, Inc. and in various other point-of-sale terminal operations, plus loss from operations of point-of-sale terminal business before discontinuance.

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COMPUTER SYSTEMS

EXCH		1973-74 RANGE (1)	CLOSE MAR 21 1974	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	175-252	213	-1 1/4	-0.5
N	COLLINS RADIO	10- 28	24 3/4	0	0.0
O	COMPUTER AUTOMATION	5- 20	11 3/4	-1 1/4	-R.8
N	CONTROL DATA CORP	31- 87	34 5/8	-2 1/4	-8.1
N	DATA GENERAL CORP	28- 49	33 1/2	-2	-5.8
O	DATAPOINT CORP	10- 21	15	- 1/4	-1.8
O	DIGITAL COMP CONTROL	2- 8	3 3/R	+1 3/R	+88.T
N	DIGITAL EQUIPMENT	73-121	118	-1 1/8	-0.9
N	ELECTRONIC ASSOC.	2- 9	2 3/A	- 1/4	-8.3
A	ELECTRONIC ENGINEER.	8- 14	8 3/4	- 3/R	-4.1
N	FOXBORO	23- 48	37 3/4	-3 1/R	-7.8
O	GENERAL AUTOMATION	22- 55	34 1/4	-1	-2.8
O	GRI COMPUTER CORP	1- 3	1 1/4	+ 1/8	+11.1
N	HEWLETT-PACKARD CO	70- RR	88	-2	-2.2
N	HONEYWELL INC	8R-139	80	0	0.0
N	IBM	22T-340	2A3	-5 3/4	-2.3
O	INTERDATA INC	T- 21	19 3/A	- 3/4	-3.8
O	MICRODATA CORP	2- 10	3 1/2	0	0.0
N	NCR	27- 48	38 1/R	- 3/4	-1.9
N	RAYTHEON CO	22- 39	36 1/2	-2 1/8	-5.5
N	SINGER CO	35- 74	38 1/2	-1 1/4	-3.3
N	SPERRY RAND	38- 58	42 1/4	-1 1/2	-3.4
A	SYSTEMS ENG. LABS	1- 8	2 1/4	- 1/2	-18.1
N	TEXAS INSTRUMENTS	83-13R	105 3/8	-2 5/8	-2.A
O	ULTIMACC SYSTEMS INC	1- 11	1 1/4	+ 1/8	+11.1
N	VARIAN ASSOCIATES	10- 20	11 1/2	-1	-8.0
N	WANG LABS.	13- 34	17	- 1/8	-0.T
N	XEROX CORP	108-189	118 3/4	-7 1/A	-5.8

LEASING COMPANIES

EXCH		1973-74 RANGE (1)	CLOSE MAR 21 1974	WEEK NET CHNGE	WEEK PCT CHNGE
A	BOOTHE COMPUTER	1- 5	1 1/R	0	0.0
O	BRESNAHAN COMP.	1- 2	2	0	0.0
O	CONDIACO INC	4- 17	5 1/4	- 1/R	-2.3
O	COMMERCE GROUP CORP	3- 8	5 3/R	0	0.0
O	COMPUTER EXCHANGE	1- 1	1/2	+ 1/4	+100.0
A	COMPUTER INVSTRS GRP	2- R	2 3/4	0	0.0
O	COMP. INSTALLATIONS	1- ?	3/4	0	0.0
M	DATRONIC RENTAL	1- 3	1 3/4	0	0.0
A	DCL INC	0- 3	5/R	- 1/8	-1R.8
A	DEARBORN-STORM	12- 2R	1R 5/R	- 3/8	-2.2
N	DPF INC	3- 8	4 3/8	- 1/4	-5.4
O	EDP RESOURCES	1- 3	3 1/A	0	0.0
A	GRANITE MGT	2- 6	2 3/R	- 1/4	-R.5
A	GREYHOUND COMPUTER	3- 8	4	- 3/8	-8.5
A	ITEL	4- 12	A 3/4	- 3/R	-T.3
N	LEASCO CORP	8- 18	11	- 5/R	-5.3
O	LEASPAC CORP	1- 8	1 3/R	0	0.0
O	LECTRO MGT INC	1- 2	3/4	+ 3/8	+100.0
O	MPR INC	3- 15	3 3/A	- 1/2	-11.T
A	PIONEER TEX CORP	A- R	A	- 1/8	-3.0
A	ROCKWOOD COMPUTER	1- 3	1	0	0.0
N	U.S. LEASING	10- 36	21 1/8	-1 5/8	-T.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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SOFTWARE & EDP SERVICES

EXCH		1973-74 RANGE (1)	CLOSE MAR 21 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- ?	1 1/8	0	0.0
A	APPLIED DATA RES.	2- 4	2 1/8	- 1/8	-5.5
O	APPLIED LOGIC	1- 3	3/8	0	0.0
N	AUTOMATIC DATA PROC	39- 94	4T 3/8	-3 3/A	-T.3
O	BRANDON APPLIED SYST	1- 1	1/2	- 1/8	-20.0
O	CENTRAL DATA SYSTEMS	3- R	4 1/2	-1 1/4	-21.7
O	COMPUTER DIMENSIONS	1- 5	2 7/8	0	0.0
O	COMPUTER HORIZONS	1- 6	3 1/2	0	0.0
O	COMPUTER NETWORK	1- 5	1 1/8	- 3/8	-25.0
N	COMPUTER SCIENCES	2- 6	3 3/8	0	0.0
O	COMPUTER TASK GROUP	1- 2	1/2	0	0.0
O	COMPUTER TECHNOLOGY	1- 3	1/2	0	0.0
O	COMPUTER USAGE	3- 9	3 3/4	0	0.0
O	COMRESS	1- 2	1/R	- 1/4	-88.8
O	COMSHARE	2- R	2 3/4	- 1/4	-8.3
N	CORDURA CORP	3- 15	2 7/8	- 3/8	-11.5
O	DATATAB	1- 4	1 5/8	0	0.0
A	ELECT COMP PROD	1- 2	1/A	0	0.0
N	ELECTRONIC DATA SYS.	12- 58	13 5/8	+1 1/4	+10.1
O	INFONATIONAL INC	1- 2	3/8	0	0.0
O	INFORMATICS	2- 7	8 3/A	0	0.0
O	I.D.A. DATA CORP	1- 1	3/8	0	0.0
O	IRS COMPUTER MARKET.	1- 5	1 1/4	0	0.0
O	KEANE ASSOCIATES	2- 5	3 1/4	0	0.0
O	KEYDATA CORP	4- 12	4 5/8	0	0.0
O	LOGICON	2- 7	4 1/4	+ 1/4	+8.2
A	MANAGEMENT DATA	1- 5	1 7/8	- 1/8	-8.2
O	NATIONAL CSS INC	1R- 42	32	-A 1/2	-12.3
O	NATIONAL COMPUTER CO	1- 1	1/2	0	0.0
O	NATIONAL INFO SRVCS	1- 2	1/8	- 1/8	-50.0
P	ON LINE SYSTEMS INC	12- 2R	27	-1 1/2	-5.2
N	PLANNING RESEARCH	2- 7	2 1/2	- 1/2	-1R.8
O	PROGRAMMING METHODS	1T- 25	17	0	0.0
O	PROGRAMMING & SYS	1- 1	1	+ 1/8	+14.2
O	RAPIDATA INC	2- 24	3 1/2	+ 3/8	+12.0
O	SCIENTIFIC COMPUTERS	1- 3	3/4	0	0.0
O	SIMPLICITY COMPUTER	1- 4	1	0	0.0
O	TMS COMPUTER CENTERS	2- R	8 1/2	0	0.0
O	TCC INC	1- 1	1/4	0	0.0
O	TYMSHARE INC	8- 13	R 3/4	- 5/R	-R.0
O	UNITED DATA CENTER	3- 8	3 1/2	0	0.0
A	URS SYSTEMS	2- R	3 1/4	+ 1/4	+8.3
N	WYLY CORP	3- 11	3 7/R	- 5/8	-13.8

PERIPHERALS & SUBSYSTEMS

EXCH		1973-74 RANGE (1)	CLOSE MAR 21 1974	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	R- 34	10 1/4	- 1/A	-2.3
O	ADVANCED MEMORY SYS	4- 23	8	- 1/4	-4.7
N	AMPEX CORP	3- T	4 3/8	+ 1/4	+R.0
O	ANDERSON JACOBSON	2- R	3 1/2	+ 1/2	+1R.8
O	BEEHIVE MEDICAL ELEC	A- 10	5	- 1/2	-R.0
A	BOLT,BERANEK & NEW	8- 12	8 1/4	- 1/4	-2.R
N	BUNKER-RAMO	8- 18	T	- 3/A	-R.8
A	CALCOMP	5- 14	10 1/R	- 3/4	-8.R
O	CAMBRIDGE MEMORIES	R- 17	12 1/4	-1	-7.5
O	CENTRONICS DATA COMP	13- 38	28 1/4	- 3/4	-3.8
O	CODEX CORP	8- 1R	13 1/2	+ 1/2	+3.R
O	COGNITRONICS	1- 3	7/R	0	0.0
O	COMPUTER COMMUN.	1- 4	1	0	0.0
A	COMPUTER EQUIPMENT	1- 3	1 3/4	0	0.0
O	COMPUTER MACHINERY	4- 13	5	+ 1/2	+11.1
O	COMPUTER TRANSCEIVER	1- 8	1 1/R	0	0.0
N	CONRAC CORP	13- 32	18 3/4	-1 1/4	-8.2
O	DATA ACCESS SYSTEMS	1- 3	2 1/4	+ 1/2	+28.5
O	DATA 100	R- 1R	10 7/R	-1 3/8	-11.2
A	DATA PRODUCTS CORP	2- 5	4	- 1/4	-5.8
O	DATA RECOGNITION	1- 3	1/2	0	0.0
O	DATA TECHNOLOGY	1- 5	3 1/2	+ 1/8	+3.7
O	DECISION DATA COMPUT	6- 40	13 3/8	+2 7/8	+27.3
O	DELTA DATA SYSTEMS	1- 1	1	+ 1/8	+14.2
O	DI/AN CONTROLS	1- 4	1 3/4	0	0.0
M	ELECTRONIC M & M	3- 8	3 3/8	- 1/4	-8.8
O	FABRI-TEK	2- 5	2 1/2	- 3/8	-13.0
O	GENERAL COMPUTER SYS	3- 9	3	- 1/A	-7.8
N	GENERAL ELECTRIC	51- T8	53 T/R	+ 3/4	+1.A
N	HAZELTINE CORP	4- 9	5 1/2	+ 1/4	+4.7
O	INFOREX INC	3- 23	2 T/8	- 1/4	-8.0
O	INFORMATION DISPLAYS	1- 2	1/2	0	0.0
O	INFORMATION INTL INC	8- 15	10 1/4	- 3/4	-8.8
A	LUNDY ELECTRONICS	3- R	2 T/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	3/8	0	0.0
N	MEMOREX	2- 19	3 1/4	+ 1/8	+4.0
A	MILGO ELECTRONICS	1A- 28	15 1/2	-1 1/2	-8.8
N	MOHAWK DATA SCI	2- 13	3 5/R	- 1/2	-12.1
O	ODEC COMPUTER SYST.	2- 6	2	0	0.0
O	OPTICAL SCANNING	2- 8	3	0	0.0
O	PERTEC CORP	3- 8	4 1/8	+ 3/8	+10.0
O	PHOTON	3- 7	3 3/4	0	0.0
A	POTTER INSTRUMENT	2- 8	4	- 1/2	-11.1
O	PRECISION INST.	2- 6	2	0	0.0
O	QUANTOR CORP	4- 10	7	- 1/2	-R.R
O	RECOGNITION EQUIP	?- R	3 1/4	+ 1/8	+4.0
N	SANDERS ASSOCIATES	4- 18	8 3/8	- 1/8	-1.R
O	SCAN DATA	1- R	2 1/R	+ 3/8	+21.4
O	STORAGE TECHNOLOGY	11- 34	13 T/8	+1 1/8	+8.R
O	SYCOR INC	R- 20	10 1/4	-1 1/4	-10.8
O	TALLY CORP.	2- 14	3 3/8	- 1/R	-3.5
O	TEC INC	5- 9	5	0	0.0
N	TEKTRONIX INC	30- 55	45	-2 1/8	-4.5
N	TELEX	3- R	3	- 1/R	-4.0
O	WANGCO INC	7- 13	12	0	0.0
O	WILTEK INC	R- 1R	8	-1	-14.2

SUPPLIES & ACCESSORIES

EXCH		1973-74 RANGE (1)	CLOSE MAR 21 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	4- R	5	- 1/4	-4.T
A	BARRY WRIGHT	5- 13	7	- 1/4	-3.4
O	CYBERMATICS INC	1- 3	1 1/R	- 1/R	-10.0
A	DATA DOCUMENTS	17- 31	30 7/8	+ T/8	+2.R
O	DUPLEX PRODUCTS INC	6- 18	R 5/8	+ 1/4	+2.R
N	ENNIS BUS. FORMS	5- R	8 7/R	+ 1/4	+3.T
O	GRAHAM MAGNETICS	T- 20	R 1/2	-1	-R.5
O	GRAPHIC CONTROLS	7- 12	9 3/4	0	0.0
N	3M COMPANY	R9- R1	T8 5/8	-2 3/8	-3.0
O	MOORE CORP LTD	4R- 65	51 1/2	- 1/4	-0.4
N	NASHUA CORP	36- 5R	38 T/R	-2	-4.R
O	REYNOLDS & REYNOLD	25- 51	32	-1 3/A	-5.1
O	STANDARD REGISTER	11- 20	14 1/2	0	0.0
O	TAB PRODUCTS CO	T- 23	T	0	0.0
N	VARCO	15- 23	20 3/A	+ 3/8	+1.8
A	WABASH MAGNETICS	5- 8	R 1/2	- 1/A	-3.T
N	WALLACE BUS FORMS	14- 26	18 3/4	+1 8/R	+8.4

Announcing Cubic. A computer tape you can lay money on.

[illegible] tape [illegible] twice [illegible] edge [illegible] the major [illegible] tape retirement.

Prove [illegible] with [illegible] simple [illegible] structural analysis [illegible] the performance [illegible] Cubic in your data processing system.

The test: Borrow [illegible] tape tester and [illegible] quarters from a Memorex representative. [illegible] beam [illegible] compare the cross-section [illegible] strength of two tapes. Cubic [illegible] stands firm under the load of 2 to 3 times as many quarters as [illegible] tapes. If we [illegible] keep the money.

The analysis: A tape's side load properties increase with the cube of the base thickness and [illegible] the added strength of [illegible] thicker [illegible]

The performance: Cubic's edge strength [illegible] extend tape life. Cubic's extra [illegible] spanning gaps in auto- [illegible]

[illegible] The difference [illegible] Cubic [illegible] longer [illegible] tape.

Memorex Corporation, Computer M[illegible] Products, 1125 Memorex Drive, MS-0064 [illegible] Clara, CA 95052